2008 Truck Hazardous Commodity Flow Report and Comparative Analysis for Clark County, Nevada

Prepared for:

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EXECUTIVE SUMMARY

This study is an update of the 2005 report on Clark County Hazardous Commodity Flows by Truck and contains a comparison of the new 2008 data to the previous data discussed in the 2005 study. The purpose of the investigation is to establish baseline conditions regarding these transportation elements, and to determine where the data is adequate for use in a risk assessment, or where the available data requires enhancement for use in a risk analysis of adding nuclear waste flows to Yucca Mountain. Clark County's economy has a relatively small industrial sector, and few movements of manufacturing raw materials reach the community as a final destination. In addition, southern Nevada does not currently export large amounts of raw materials. However, Clark County is adjacent to the greater Los Angeles ports and industrial concentrations, and is connected by rail and highway infrastructure to southern California. Clark County experiences considerable volumes of through-transit flows bound from and destined to the Los Angeles area.

This investigation of hazardous commodity flows by highway in and through Clark County, Nevada estimates truck cargo movements by commodity class tons and number of truck loads for the year 2008 and compares them to 2005. A commercial data source was utilized for this estimate. The TRANSEARCH database includes government and other data to estimate sector components of the national economy. An Input-Output model estimates exchanges between producers and consumers, and models the flow of commodities in the transportation of these goods. The hazardous commodities involved in these exchanges are identified by Standard Transportation Commodity Classification codes (STCC).

Detailed information pertaining to highway use, accidents, and hazardous commodity spills also was collected and presented for 2008 and compared to the 2005 figures. With slightly less than 19% of Nevada highways, Clark County accounted for 64.1% of the total highway miles traveled in Nevada for 2005. In 2008, Clark County highways comprised slightly over 19% of Nevada highways and accounted for 65.7% of total highway miles traveled. Though not reported on this examination, trend data for highway safety were gathered for a future study that requires estimating the potential highway accident/damage probabilities.

Findings from this Report on the hazardous commodity flows by truck in and through Clark County during 2005 and 2008 can be summarized in two broad characterizations. First, most hazardous commodity flows by highway in the County originated or terminated somewhere else. Most of those flows passed through Clark County to another destination. Second, fuels and flammable substances dominated the HAZMAT flows coming in to Clark County by truck in 2005 as well as 2008. Flows by truck involved more diverse and varied commodities than those cargoes moving by rail. Overall, the tonnage flows of hazardous commodities in, out and through Clark County decreased by 55.1% from 2005 to 2008.

Truck commodity flows of all types will be impacted by future flows of nuclear waste to Yucca Mountain, when and if that occurs, and if it includes a substantial highway component. This investigation provides baseline estimates for future efforts to assess the risk of adding those hazardous commodities to current conditions.

1.0 INTRODUCTION

This hazardous commodity flow survey documents and examines shipments of hazardous materials in Clark County, Nevada. Specifically, this report examines truck movements of hazardous materials to, from, through, and within Clark County in 2008, which is the latest period for which a complete data set is available. This Report also provides comparisons to the flow of each hazardous material by Standard Transportation Commodity Code 4 category to that found in the previous 2005 study. The purpose of this report is to characterize commodity flows in 2008 and compare them against the baseline conditions of flows established in 2005. The Report provides information that includes an examination of the hazardous commodities moving on Clark County highways, the volumes of these flows of hazardous materials, the level of use these highways experience and the accident rates on these highways. The baseline conditions in 2005, along with 2008 comparison figures and estimates provide the basis of vulnerability from hazardous waste shipments by truck and will be used to estimate the parameters for future detailed risk assessments.

This Report is divided into three major sections. First, there is a brief discussion of the main objective of the study. A discussion of the truck shipment regulations involved in transporting, reporting, and general compliance is included in this section, as are examples of state and national reporting efforts. The next section presents the methodology and data for the estimation and evaluation of: 1) highway infrastructure use rates; 2) highway accident rates; and 3) hazardous commodity shipments by truck originating in, passing through, and destined for Clark County, Nevada. Finally, results are presented at national, state, and county levels providing a comparative analysis and demonstrating the local and state context to these flows.

The Las Vegas valley, the economic engine of Clark County and southern Nevada, has been one of the fastest growing metropolitan areas in the United States over the last decade. The metropolitan area and Clark County sit astride an Interstate Highway and a major transcontinental rail route. Hazardous materials are transported by highway, rail, air, and pipeline every day, and there are accidents and incidents involved in the transportation and delivery of federally regulated hazardous materials. This report investigates the regulated flow of these materials in Clark County by truck on highways, and presents results from an analysis of the distribution of these flows. Future estimation of the risk from hazardous commodity flows by truck will use this baseline investigation to evaluate the elevated risk from adding shipments of spent nuclear fuel and other nuclear wastes to the proposed Yucca Mountain Nuclear Waste Repository when, and if, it is constructed.

1.1 Background

The purpose of a hazardous commodity flow survey is to identify and document the types and volumes of hazardous material moving within, to, through, and from a specific geographic location. Identifying movements of hazardous material is of interest to government agencies responsible for transportation planning; public safety, and emergency response. Often a hazardous materials (HAZMAT) study is a component of an integrated risk assessment. The Clark County Department of Comprehensive Planning's Nuclear Waste Division commissioned this report in part not only to comply with Department of Homeland Security directives, but also to support strategic planning goals, and more importantly, to provide a baseline for the study of potential impacts should the shipment of high-level nuclear waste occur. After data for shipments of hazardous substances by all modes of transportation are assembled, assessment of risk will be addressed in future studies.

The Hazardous Materials Transportation Act of 1975 (HMTA) is the major transportation-related statute affecting transportation of hazardous cargoes. The Federal Hazardous Material Transportation law (Federal HAZMAT law), 49 U.S. Code (U.S.C.) 5101 et seq. is the primary statute regulating these flows in the United States. By regulating these flows, the U.S. Department of Transportation (USDOT) protects life and property from accidents in handling and shipping these materials (USDOT, 1997). Included in this legislation are provisions for federal grants involving emergency preparedness training for response to shipping accidents.

Federal regulations contained in Title 49 of the Code of Federal Regulations (CFR) Parts 100-180 outline the federal requirements for transporting hazardous materials and includes five distinct elements: 1) hazardous materials identification and classification, 2) hazard communication, 3) packaging requirements, 4) operational rules, and 5) training. Each of these components has different requirements for the various sectors of the economy and for different portions of the workforce. In recent developments for operational rules, in response to two industry petitions for rulemaking, a risk-based adjustment of transportation security plan requirements was proposed by the Pipeline and Hazardous Materials Safety Administration (PHMSA) to the Office of Management and Budget (OMB). The new security plan regulations are intended to create a distinction between hazardous materials that present a significant security risk while in transportation and the vast majority of hazardous materials that pose no significant security risk in transportation. Based on an evaluation of the security threats associated with specific types and quantities of hazardous materials, the final rule narrows the list of materials subject to security plan requirements and reduces associated regulatory costs and paperwork burden. The final rule also clarifies certain requirements related to security planning, training, and documentation and will be effective October 1, 2010. Appendix E highlights current threshold quantities and new thresholds by Class as amended by this rule (PHMSA, 2010).

1.1.1 Commodity Flow Surveys

The U.S. Census Bureau conducts national-scale commodity flow surveys for use by government agencies, industry analysts, and private individuals to assess changes in the economy (BTS, 2004b). These surveys have been conducted at five-year intervals since 1967 and utilize samples of establishment data of shipments of commodities. Mining, manufacturing, wholesale trade, and selected retail industry establishments meeting certain criteria report to the federal government within standard guidelines and in standard formats what they are shipping. The reporting entities are commercial establishments within specific sectors of the economy and exclude private movements of freight and movements by entities not required to report commodity movements to the U.S. Census Bureau. Starting in 1993, the national reports have been augmented by state reports detailing individual state commodity shipments and trends.

Under the Clinton administration, US DOT recognized the need for better quality data to monitor economic activity in the changing global economy (BTS, 1993). Among the deficiencies in data collection identified were the detailed geography of flows of passengers and commodities. Very little information was previously gathered below the level of intermodal connections. Among the deficiencies regarding flows were details by trucks-for-hire and characteristics of shipments and commodities, particularly related to changes in flows brought about by the North American Free Trade Agreement (NAFTA).

The 1993 Commodity Flow Survey (U.S. Census, 1994) included the findings of a truck inventory and use survey as a first step to address this deficiency (U.S. Census, 1994b). For the first time in 1993, characteristics of trucks using the highways and their cargoes were introduced. In 1997, data tables were added reporting flows between certain selected states (U.S. Census, 1999). The states selected for examination included those states with a large manufacturing base predicating large commodity exchanges. Nevada was not one of those selected states. Since 1997, these economic census reports have included a supplemental report on the movement of hazardous materials (U.S. Census, 1999b). Again in 2002, national hazardous material flows were available but no detailed information was provided for Nevada (U.S. Census, 2004).

During the same time period, the Nevada Department of Transportation (NDOT) conducted a Goods Movement Study (NDOT, 2000) to estimate state level commodity flows. This effort involved the use of estimates from the TRANSEARCH statistical model based on national transportation, commerce, and other economic data. The TRANSEARCH database models all modes of commodity transportation in the United States at state, BEA area (metropolitan areas and interdependent counties as defined by the BEA, 2004), and county scales. Numerous railroads, trucking carriers, state and federal agencies, and private industry employ this same database for estimating commodity flows at various scales. At that time of this TRANSEARCH model development, it did not include details regarding flows of hazardous commodities. Following the shift in federal focus and its reporting requirements, additional information was included in the TRANSEARCH database related to HAZMAT cargoes.

Subsequent to the September 2001 attacks on the World Trade Center, parts of the federal government were reorganized under the Department of Homeland Security. Changes occurred in the attention of the federal government to vulnerability as well as the acquisition and dissemination of information by government. Protection of vital assets and mass population areas altered the emphasis in much of the interaction between the federal agencies and state and local governments. As a result, maintaining federal revenue-sharing eligibility in many programs now requires identifying critical assets and vulnerabilities. Continued economic vitality is directly related to the timely and efficient exchange of goods and services in the market economy composed of these assets.

Two excellent examples of recent studies illustrate the efforts and methods used in investigations of hazardous commodity flows. The U.S. Environmental Protection Agency (EPA) is responsible for chemical emergency planning and prevention efforts at the U.S./Mexico border (EPA, 2001). EPA examined the characteristics and volumes of hazardous commodity flows at the border near San Diego, identifying the data required to analyze the flows of hazardous commodities. The study specifically addressed the different purposes between a commodity flow survey and hazardous materials study. Rather than focusing on the planning aspects to enhance business economics, this study directs attention to the evaluation of emergency preparedness and minimizing exposure to life-threatening releases of dangerous substances.

Additionally, Sedgwick County, Kansas conducted a commodity flow survey of hazardous materials to specifically evaluate the risk to local populations from the flow of hazardous commodities by all modes (BTS, 2004). This study not only detailed the characteristics of the commodity flows, but also characterized the population and infrastructure to determine points of vulnerability. Commodity characteristics, transportation infrastructure, traffic densities, natural hazards, and accidents were the primary data elements gathered and evaluated. Particular facilities within a half-mile radius of transportation facilities such as schools, hospitals and health care facilities, amusement and convention facilities, and prisons were identified as facing elevated risk, though that level of risk was not quantified. Based on the evaluation, specific planning recommendations identified discrete locations requiring routing, zoning, and infrastructure modifications to minimize the elevated risk.

Far less has been documented regarding the movements of hazardous commodities than the exchange of general commodities. However, the modeling of general commodity flows coupled with reporting requirements for transportation prompted the addition of hazardous commodities and cargoes to the investigation of the transport of goods. While some measure of regulatory compliance is involved with most hazardous commodity movement studies, significant benefits are realized at many levels of government and society from assembling and sharing the knowledge gained. With the goal of assembling and characterizing Clark County truck flows of hazardous commodities as the objective, the following methodology outlines the sources of data in the report and describes how they are prepared and interpreted.

2.0 METHODOLOGY

Guidance on the methodology for conducting hazardous commodity flow surveys comes from the USDOT Research and Special Programs Administration (USDOT, 1995). While much of this guidance document pertains to the estimation and acquisition of cargo characteristics, it also includes recommendations for additional information to collect for estimation of highway use and accident rates. Specifically, truck flow and truck accident rates are the components of interest in addition to the commodity flows.

The best source of information at the local level for a commodity flow survey is primary data collected from a carefully constructed survey. However, collecting primary data is an expensive and time-consuming operation. For this HAZMAT study of Clark County, the quality of the TRANSEARCH modeling data, as used by federal agencies, NDOT, numerous railroads, and other commercial firms was deemed appropriate for baseline estimates. We are cognizant of concerns about data issues, and provide further discussion following the methodology.

Data assembled for study in this report fall under three distinct categories:

1. Utilization data include estimates of the level of use of highways. These use estimates include the proportion of truck traffic on highways.

2. Accident and fatality rates on the highways provide a measure of efficiency in the flows.

3. The final data element includes the estimation of total tonnage or volume of movements, the number of truckloads of HAZMAT, and the distribution and concentration of those flows in Clark County.

2.1 Highway Utilization

NDOT operates and maintains nearly 5,400 miles of road in the state (NDOT, 2008). Responsibilities include Interstate, U.S., and state-designated highways. Activities include expenditures of hundreds of millions of dollars to plan, design, construct, operate, maintain, and refurbish highways. In order to keep track of revenues and expenses, considerable data on the quality, distance, number of lanes, and functional class of highways are also maintained. These records are provided to the federal government for tabulation of highway revenue sharing funds. The other states maintain and provide similar records, and provide USDOT with these data for inclusion in the Highway Performance Monitoring System (HPMS).

NDOT estimates usage of the state highways through several data collection methods. Continuous counts of hourly traffic volumes are monitored at 94 fixed locations throughout the state (NDOT, 2008). Shorter counts of seven-day duration are collected at mobile sites and factored to Annual Average Daily Traffic (AADT) counts. From these data, estimates are computed for Annual Vehicle Miles Traveled (AVMT) and reported in millions of miles (NDOT, 2008b; BTS, 2008). For every segment of NDOT highway, estimates are calculated for annual usage including the proportion of total in the truck category. As in studies examining discrete sections of highways (Matranga and Semmons, 2000), we define highway segments as the portion of any state, federal, or interstate highway between its intersection with any other state, federal, or interstate highway. Additional rates of use by other aggregated categories such as county totals, functional class, urban or rural location, and others are also tabulated and presented in annual reports. Similar tabulations can be requested from NDOT for higher resolution within the state.

Each state maintains and reports this same information in a federally mandated format to maintain eligibility for revenue sharing related to highway funding. National estimates of highway utilization are compiled by aggregating the multiple parts reported by the states. The Federal Highway Administration (FHWA) oversees the process and reports national use rates (FHWA, 2008). Proportional use by truck and by private truck is also tabulated.

Critical evaluation of the methods involving the collection of data including estimates, sampling error, data reliability and quality is a constant process to those agencies responsible for these activities. The U.S. Census Bureau (2004) discusses factors leading to bias and variance in highway use estimations. With the constant attention to data quality and accuracy, best practices are regularly evaluated and implemented when demonstrated successful. A discussion of the strengths and weaknesses of using these sample data is included in Section 2.4. Caution is urged when interpreting these data, but they form the most reliable estimate available for rates of vehicular traffic and the truck component of that total.

2.2 Highway Accidents

As noted above, another important component and typical of most hazardous materials flow studies is an assembly of information of accidents and accident rates on the highways on which hazardous commodities move. Several USDOT divisions maintain accident records for different purposes. The Federal Motor Carrier Safety Administration (FMCSA) maintains accident and safety data at the John A. Volpe National Transportation Systems Center in Cambridge, Massachusetts (Volpe, 2007d). The Volpe Center is part of USDOT's Research and Innovative Technology Administration and is a federal fee for service organization specializing in transportation and technology issues. The Volpe Center prepares annual reports of crash statistics for large trucks and buses involved in fatal and non-fatal crashes. Sources for these data are the Fatality Analysis Reporting System (FARS) and the Motor Carrier Management Information System (MCMIS).

FARS is a database that is used to provide an overall measure of transit safety and objectively evaluate safety standards and programs. FARS contains data on fatal crashes in the 50 states, the District of Columbia, and Puerto Rico. To be documented in FARS, the crash must involve a motor vehicle traveling on a highway open to the public that involves a death within 30 days resulting from this motor vehicle accident. The death resulting from the accident can be a vehicle occupant or a non-occupant such as a pedestrian. The database includes over 100 fields of data characterizing the crash, occupants, vehicle, and circumstances of the crash. Under a cooperative agreement with the states, data is compiled at the state level in a standard format and assembled by the National Highway Traffic Safety Administration (NHTSA).

FARS analysts are employees of the individual states that receive training to comply with reporting format and requirements. These analysts utilize numerous local sources to compile data including the following (NHTSA, 2007):

- Police Accident Reports (PARs)
- State vehicle registration files
- State driver licensing files
- State Highway Department data
- Vital statistics
- Death certificates
- Coroner/medical examiner reports
- Hospital medical records
- Emergency medical service reports

FARS accident reports contain three components: 1) Accident Form, 2) Vehicle and Driver Form, and 3) Person Form. The Accident Form includes information pertaining to the time and location of the crash, the first harmful event, whether it is a hit-and-run crash, and the number of vehicles and people involved. The Vehicle and Driver Form includes the vehicle type, initial and principle impact points, most harmful event, and drivers' license status. The Person Form includes information on each person involved in the crash, and details including age, gender, role in the crash such as driver, passenger, or non-motorist, injury severity, and restraint use.

A second source of accident data is FMCSA, whose responsibility is "to reduce crashes, injuries, and fatalities involving large trucks and buses" (FMCSA, 2007). FMCSA was established as a separate administration within USDOT on January 1, 2000, pursuant to the Motor Carrier Safety Improvement Act of 1999. To carry out its mission, FMCSA:

- Develops and enforces data-driven regulations that balance motor carrier (truck and bus companies) safety with industry efficiency;
- Harnesses safety information systems to focus on higher risk carriers in enforcing the safety regulations;
- Targets educational messages to carriers, commercial drivers, and the public; and
- Partners with stakeholders including Federal, State, and local enforcement agencies, the motor carrier industry, safety groups, and organized labor on efforts to reduce bus and truck-related crashes (FMCSA, 2007b).

Understanding motor carrier accidents is essential to reducing them, so FMCSA collects data including a national inventory of motor carriers and shippers subject to the Federal Motor Carrier Safety Regulations and Hazardous Materials Regulations. Accident data assembled by FMCSA is maintained in the MCMIS Crash File. The agency maintains personally identified information (PII) for monitoring performance of individual carriers in addition to non- personally identified information. Access to portions of the data is restricted, but the Volpe Center utilizes fatal crash data in their annual national and state reports of large truck crashes.

The MCMIS crash data is known for the under-reporting of fatalities (Blower and Matteson, 2003), and the Volpe Center adds a caution on the report download page that states "Although efforts have been made to provide the most accurate and complete MCMIS Crash data possible, data quality can vary from state to state. Please use caution when interpreting MCMIS crash data" (Volpe, 2007). In an evaluation of the MCMIS data for FMCSA, the overall level of state data reporting was found lacking (Blower and Matteson, 2003). While improvements in data quality over time are recognized, the expected rate of reporting from the states remains low, particularly for bus crashes. The rate of injury reporting is high, but fatality reports are low when compared to these data compiled in FARS, the Trucks Involved in Fatal Accidents (TIFA) file, and the Buses Involved in Fatal Accidents (BIFA) file. For this report, we present accident data from both FARS and MCMIS sources. FARS data is appropriate in a risk analysis for estimating fatality rates for large truck crashes, while MCMIS data provides an estimation of accident-related injury.

While the Volpe Center provides state profiles, NDOT also compiles accident data on Nevada highways. As of current investigation, the most current Nevada crash data is for 2006 (NDOT, 2006).

2.3 Hazardous Materials

Detailed data on the existing flows of hazardous materials are not aggregated in a manner amenable to analysis at the local level desired for this study. While USDOT does maintain records for individual shipments of commercially transported commodities, these records are deemed proprietary for the information they could reveal about individual firms (U.S. Census, 1994). These data have been used for mandated reporting on commodity flows and other economic census reports. National and state-level data are prepared, evaluated, and presented in numerous government reports. Sample data on individual shipments are used with other information to model data sets of flow estimates. Such integrated data modeling of origin/destination transportation flows are particularly useful for analysis of commodity flows between counties.

Renewed interest in commodity flows in the early 1990s stimulated development of new federal transportation reports and the gathering of new information to produce these reports (BTS, 1993). The Center for Transportation Analysis (CTA) at Oak Ridge National Laboratory (ORNL) constructed an integrated transportation model to matched linked pairs of origin/destination zip codes to calculate distance for the 1993 U.S. Commodity Flow Survey (U.S. Census, 1993). The U.S. Census Bureau gathered cargo shipment data from approximately 100,000 establishments of over 800,000 national establishments and used the ORNL network model to reliably estimate flows and characterize the delivery of these commodities.

Additional information is included in each Commodity Flow Survey cycle and resulting report, and collection methods are constantly evaluated and refined. The linear network dataset developed by ORNL is combined with USDOT and U.S. Census Bureau data for increasing geographic detail of commodity flows and for reliability in the estimates. All of these data sources are incorporated in the TRANSEARCH model used by NDOT for their State Goods Movement Study. These data are updated annually and have been refined since the NDOT use, to include movements of hazardous commodity cargoes.

We use the TRANSEARCH flow estimates (Global Insight, 2009) to investigate and present information related to the transportation of HAZMAT on the route segments of Interstate, U.S., and state highways from, to, within, and through Clark County, Nevada. Additionally, 2005 TRANSEARCH estimates by commodity class are compared to 2008 figures. Title 49 CFR Part 171 defines HAZMAT in nine classes of substances as shown in Table 1 (with detailed descriptions and definitions for classes and divisions in Appendix D, and a selected list of hazardous commodities in Appendix A).

Table 1: Classes of Hazardous Materials

Class	Hazardous Material
1	**Explosives** · Potential for mass detonation likely · Potential for mass detonation unlikely
2	**Gases** · Flammable · Non-Flammable · Poisonous
3	**Liquids** (flammable and combustible)
4	**Flammable solids** · Spontaneously combustible materials · Dangerous when wet materials
5	**Oxidizers and organic peroxides**
6	**Toxic materials and infectious substances**
7	**Radioactive materials**
8	**Corrosive materials**
9	**Miscellaneous dangerous goods**

The model of all commodity flows by all modes is a national-scale model that includes international shipments from Canada and Mexico to the United States. A geographic information system (GIS) network is used to model this flow of goods. This model captures the flow estimates originating in or delivered to the United States as well as flows within the states. An iteration of the model can extract specific flow information for different scales of analysis. For this project, truck transportation of HAZMAT flows within Clark County, Nevada was extracted. These data estimating truck transportation flows of HAZMAT for the year 2005 accomplish the following:

- identify the entry route segment (excluding local flows)
- identify the exit route segment (excluding local flows)
- identify the HAZMAT cargo by 4-digit Surface Transportation Commodity Code (STCC4)
- provide a weight estimate of the load (excluding local flows)
- provide limited information of size of the truck (excluding local flows)
- provide an estimate for number of loads (excluding local flows)
- identify additional GIS elements required for network modeling

The data do not provide information about individual trucks, but serve as a mathematical model estimating flows between senders and receivers in commodity chains. Given a certain amount of data about industrial location and the shipments of raw materials and finished products, accurate predictions of where those commodities will flow is achieved. Care must be taken to remember these numbers represent estimates of network flows on highway segments between origin and destination.

Characterizing these flow estimates and tabulating them for further evaluation by route segment is our objective.

One drawback to using these data at the county level is the lack of detail for local movements. Local flows of hazardous commodities that originate and terminate within the county are identified by class of hazardous commodity only. There is no spatial detail as to where on the highway network these flows enter and exit. There are few estimates of volume or number of loads. Given the method these data are compiled—the national modeling of establishment level exchanges of commercial commodities—the identification of hazardous commodities is useful and provides information previously unknown. In an attempt to supplement the deficiency regarding local distribution, we also examine location information from EPA sources for establishments handling, transporting, or storing large quantities of federally regulated chemicals.

The Biennial Reporting System (BRS) allows EPA to track the generation, shipment, and receipt of hazardous waste. Information is derived from the Hazardous Waste Reports that must be filed every two years under the Resource Conservation and Recovery Act (RCRA) program. RCRA is the federal statute that regulates the generation, treatment, storage, disposal, or recycling of solid and hazardous waste. The BRS further divides categories into Large Quantity Generators (LQGs) and Small Quantity Generators (SQGs). In this report we use information on LQGs located in Clark County. These are facilities that in any month generate more than 2,200 pounds of RCRA waste, accumulate more than 2.2 pounds of RCRA acute hazardous waste, or accumulate more than 220 pounds of spill cleanup material contaminated with RCRA acute hazardous waste. This initial effort provides a geographic distribution of local points of hazardous substance concentrations in the county. For this report, we identify site locations and map the distribution of these sites, particularly in relation to the highway transportation infrastructure.

Different divisions of the federal government assemble and report on highway use. This report only seeks the total utilization rate on certain portions. Our collection effort includes much more detail and we retain this important information for use in future studies. We use the federal highway accident databases to track fatalities and injuries. We identify an additional local source for county accident data that can be enhanced and used for future study. Our understanding of the transportation hazard on Clark County highways is supplemented with the locations of local large volume users of these regulated items. The EPA databases include much more information about hazardous substances and what annual volumes may be present at locations within the county. This source does not provide information about highway movements but does identify locations involved in those movements. Future work of a scope broader than highway flows should include a more detailed investigation of this source. Prior to discussion of what these data reveal, the following section presents a brief discussion regarding data quality.

2.4 Data Quality

The Bureau of Transportation Statistics (BTS) maintains a web portal for the retrieval of official documents and data related to the National Economic Census Commodity Flow Surveys. One of the links provides the Census description of sampling variability, error, and reliability (BTS, 2007). In the discussion of sampling variability, the Census identifies how the random selection of those establishments that respond to a survey may vary from the population of all establishments. This type of sampling error can be calculated, estimated, and compensated for by larger samples but is never eliminated. The discussion concludes with an explanation of non-sampling error, or systematic bias. The

Census does not provide details in the response rate or provide a confidence level for their estimates, but the very size of the samples (200,000 in 1993 and 100,000 in 1997 of a population of over 800,000 establishments) indicates a very reliable estimate of the true population characteristics.

All of the data we use are sample data. Most meaningful data describing and monitoring economic and social activity in our country come from sample data. The function of the U.S. Census Bureau is to collect primary population counts of the entire population every 10 years. This government entity has been conducting this task since the early 1800s and never gets a complete count of the population. The honing of these skills does enable the Census to conduct professional sampling and tabulating of related social and economic data between the Census of Population counts. There are no more reliable estimates of the material the Census gathers than the Census reports.

Information gathered by the states may not enjoy the same expertise as the Census retains, but state transportation departments are the best qualified for that task. No other entity has the resources or reason to collect statewide traffic counts within the same guidelines as a state transportation division does. State transportation agencies may not be the best source for information related to accidents and commodity flows. We seek records from the Nevada State Police who travel the highways and respond to accidents for additional information on this portion of the analysis.

As we evaluate the information we have assembled as previously described, we will crosscheck what supplementary information may be available; identify where data are not readily available, and how that might be remedied. We will examine if collection of primary data within the county may be required to satisfactorily answer the questions regarding the flows of hazardous commodities on Clark County highways.

3.0 MOVEMENT OF HAZARDOUS COMMODITIES IN CLARK COUNTY

This investigation of the movement of hazardous commodities by truck includes a presentation of three distinct components: 1) the volume of traffic on the national, state, and county highways and an estimate of the proportion of truck traffic in that flow; 2) the rate of accidents on the national, state, and county highways and an estimate of the proportions of truck accidents in that total; and 3) an estimate of the type and volume of federally regulated hazardous commodities moving on the national, Nevada, and Clark County highways.

3.1 Highway Utilization

National-scale data on highway use are assembled for several purposes, with allocation of funds and safety monitoring the primary motivation behind this effort (FHWA, 2007d). FHWA collects data from the 50 states through the Highway Performance Monitoring System (HPMS) to support legislative and administrative goals of the national and state agencies. Allocation of transportation revenue sharing funds is mostly based on the intensity of use of highways. Because of the relationship between the collection of state traffic data and highway funding, the comparison of national data to state-level data is straightforward. State data are gathered using federal guidelines and national estimates are derived from aggregating the state reports.

National and Nevada data are gathered from the Travel and Traffic Data portion of Highway Statistics 2008 (FHWA, 2008) and compared to 2005 data gathered in the previous report. Table 2 presents the FHWA results for total vehicle miles traveled in 2005 and 2008, and a breakdown by type of vehicle.

Commercial truck traffic is almost entirely captured in the Single-unit 2-axle and Combination Trucks categories. Large Truck traffic on the nation's highways accounts for only 7.65% of the total miles traveled. There is not a state report for the FHWA Table VM-1 but a similar calculation is possible from other data.

Table 2: Annual Vehicle Distance Traveled in Miles by Vehicle Type, 2005 and 2008				
Item	**Motor Vehicle Travel: Total Rural and Urban (millions of vehicle-miles) 2005**	**Motor Vehicle Travel: Total Rural and Urban (millions of vehicle-miles) 2008**	**Proportion of Total 2005**	**Proportion of Total 2008**
Passenger Cars	1,689,965	1,615,850	56.52%	54.34%
Motorcycles	10,770	14,484	0.36%	0.49%
Buses	6,646	7,114	0.22%	0.24%
Other 2-axle 4-tire Vehicle	1,059,590	1,108,603	35.44%	37.28%
Single-Unit 2-axle 6-tire or more Trucks	79,174	83,951	2.65%	2.82%
Combination Trucks	143,662	143,507	4.81%	4.83%
All Motor Vehicles	2,989,807	2,973,509	100.00%	100.00%

Source: FHWA Table VM-1 November 2006 and December 2009

Table 2 also includes type of vehicle and a breakdown by urban and rural route classification. The urban and rural components are combined in this report for total vehicle miles traveled as well as retaining the proportion of total by type of vehicle. The capability to distinguish use rates and accident rates for urban as well as rural highway portions may be important for future study. The other 2-axle 4-tire vehicle column includes mainly private pick-up trucks and SUVs. Private vehicle traffic accounts for over 90% of the national total. In terms of the national truck volumes, large combination trucks account for almost twice as many vehicle miles as the smaller, single unit trucks. This relation stays consistent for 2008 data as well.

A state component for truck proportion is not included in this particular FHWA table. The Nevada annual report on highway facts and data for 2007 (NDOT, 2009) indicates 83% of the total AVMT was truck traffic.

Additional breakdowns and state-level components are found in Tables VM-2 (FHWA, 2007b and 2009b) and VM-3 (FHWA, 2007c and 2009c). Table 3 presents national and Nevada information extracted from Table VM-2. This breakdown portrays the total traffic by urban and rural components as well as those proportions of the total using interstate and other highways. While the additional detail is not important for this study, differentiating risk in future work requires calculating various rates for use on differing segments and accidents under different conditions. For example, highway characteristics, flow volumes, and accident rates for U.S. Highway 93 (US 93) at the Lincoln County line will be very different for what is normal on Interstate 15 (I-15) through the "Spaghetti Bowl."

Table 3: Functional System Travel - Annual Vehicle Miles (in millions), 2005 and 2008

		Nevada 2005	Nevada 2008	U.S. Total 2005	U.S. Total 2008
Rural	Interstate	1,955	1,826	258,790	243,290
	Total	5,635	4,868	1,037,937	990,418
Urban	Interstate	2,899	3,515	469,070	476,091
	Other Freeways and Expressways	1,679	1,771	213,727	222,624
	Total	15,141	15,912	1,951,870	1,983,091
	Rural + Urban Total	**20,776**	**20,780**	**2,989,807**	**2,973,509**

Source: FHWA Table VM-2 October 2006 and 2009

Table 4 includes national and Nevada reports for highway use on the National Highway System and by Federal Aid Highways. Again, while the distinction may not be important for this report, this may be an essential data element. If high-level nuclear waste begins to move on the nation's highways in large amounts, most of that travel will occur on the National Highway System. To establish a baseline is the objective of this report. To track and record events as they unfold will involve future effort. As Table 4 shows, this strategic network accounts for over one-third of Nevada and national vehicular travel.

Table 4: Federal-Aid Highway Travel - Annual Vehicle Miles (in millions), 2005 and 2008

	State	Nevada 2005	Nevada 2008	U.S. Total 2005	U.S. Total 2008
National Highway System	Interstate	4,854	5,301	727,860	719,341
	Other	3,849	3,582	607,698	599,928
	Total	8,703	8,883	1,335,558	1,319,269
Other Federal-aid Highways		8,398	8,728	1,201,054	1,198,367
All Federal-aid Highways		17,101	17,611	2,536,612	2,517,636
All Non Federal-aid Highways		3,675	3,169	453,195	455,873

Source: FHWA Table VM-3 October 2006 and 2009

For estimates of highway utilization in Clark County, total annual traffic for 2005 and 2008 is found in the annual reports for vehicle miles traveled (NDOT, 2006b and NDOT, 2009b). Tables 5.1 and 5.2 present the total AVMT for Nevada in 2005 and 2008, and the portion from each county. While Clark County only accounted for 18.74% in 2005 and 19.32% in 2008 of the highway miles in the state, the miles driven annually in Clark County is nearly two-thirds of Nevada's total.

Table 5.1: Nevada Average Vehicle Miles Traveled (AVMT) by County, 2005

County	% AVMT	AVMT	% Miles	Miles
Carson City	1.92%	400,625,770	0.85%	294
Churchill	1.41%	293,562,755	2.59%	895
Clark	64.13%	13,360,796,461	18.74%	6,490

Table 5.1: Nevada Average Vehicle Miles Traveled (AVMT) by County, 2005

County	% AVMT	AVMT	% Miles	Miles
Douglas	2.69%	561,425,487	1.96%	679
Elko	3.14%	655,113,815	8.32%	2,882
Esmeralda	0.44%	91,321,993	3.82%	1,324
Eureka	0.56%	117,255,476	5.72%	1,979
Humboldt	1.58%	328,551,812	4.80%	1,663
Lander	0.61%	127,373,868	4.64%	1,607
Lincoln	0.54%	111,846,424	10.67%	3,695
Lyon	2.40%	499,895,660	3.66%	1,268
Mineral	0.55%	115,260,883	2.88%	997
Nye	1.84%	383,714,820	9.43%	3,266
Pershing	1.34%	278,884,729	6.98%	2,417
Storey	0.13%	27,058,764	0.23%	78
Washoe	15.95%	3,322,937,918	7.28%	2,521
White Pine	0.75%	157,264,663	7.42%	2,569
Grand Totals	**100.00%**	**20,832,891,297**	**100.00%**	**34,624**

Source: NDOT, 2006b

Table 5.2: Nevada Average Vehicle Mile Traveled (AVMT) by County, 2008				
County	**%AVMT**	**AVMT**	**% Miles**	**Miles**
Carson	1.72%	360,939,317	0.89%	301
Churchill	1.38%	290,967,937	2.80%	950
Clark	65.66%	13,802,090,863	19.32%	6,552
Douglas	2.47%	518,800,043	2.12%	718
Elko	3.14%	660,740,509	6.87%	2,330
Esmeralda	0.41%	87,003,692	3.90%	1,324
Eureka	0.58%	122,006,714	5.81%	1,969
Humboldt	1.45%	305,579,628	4.47%	1,517
Lander	0.57%	119,215,468	4.80%	1,629
Lincoln	0.57%	119,046,053	11.37%	3,857
Lyon	2.28%	479,239,430	3.85%	1,306
Mineral	0.53%	111,690,799	2.56%	867
Nye	1.78%	374,313,497	10.51%	3,564
Pershing	1.13%	236,518,817	4.55%	1,543
Storey	0.13%	28,346,141	0.28%	96
Washoe	15.47%	3,252,243,991	7.77%	2,635
White Pine	0.73%	153,105,532	8.11%	2,750
Grand Totals	**100%**	**21,021,848,431**	**100%**	**33,907**

Source: NDOT, 2009b

For this report, truck utilization data for certain segments within Clark County were provided by NDOT (2010). Route segments were selected for highways that may carry truck cargo to Yucca Mountain through Clark County. Note that CC-215 was not completed in 2005 and AVMT totals for CC-215 reflect an unfinished highway. In 2008, AVMT totals for CC-215 segments were nearly 4 times that of 2005 due to addition of new segments. The following code list provides a key to segments shown on Figure 1.

Segment Map Code	Segment Description
I-15:1	Clark -San Bernardino County boundary to Blue Diamond Road interchange
I-15:2	Between Blue Diamond Road interchange and W 215 interchange
I-15:3	W 215 interchange to US-95 Interchange "Spaghetti Bowl"
I-15:4	US 95-I15 Interchange (Spaghetti Bowl) to N 215-I 15
I-15:5	N 215 to US 93-I 15 Interchange
I-15:6	US 93-I 15 Interchange to Clark County-Mohave County boundary
US 95:1	Clark County-San Bernardino County boundary to US 93-95 Interchange
US 95:2	US 93-95 Interchange to I 15 Interchange "Spaghetti Bowl"
US 95:3	I 15 Interchange "Spaghetti Bowl" to N 215-95 interchange
US 95:4	N 215-95 interchange to Clark County-Nye County boundary
US 93:1	Us 93-95 Interchange to Arizona border
US 93:2	US 93-I 15 Interchange to Clark-Lincoln County border
CC 215:1	Between US S 95- and S I 15 (000215)
CC 215:2	Between S I 15 and Summerlin Pkwy exit
CC 215:3	Between W Summerlin Pwky and US N95
CC 215:4	Between US N95 and N I 15

Figure 1: Clark County Highway Segments for Estimated AVMT, 2008

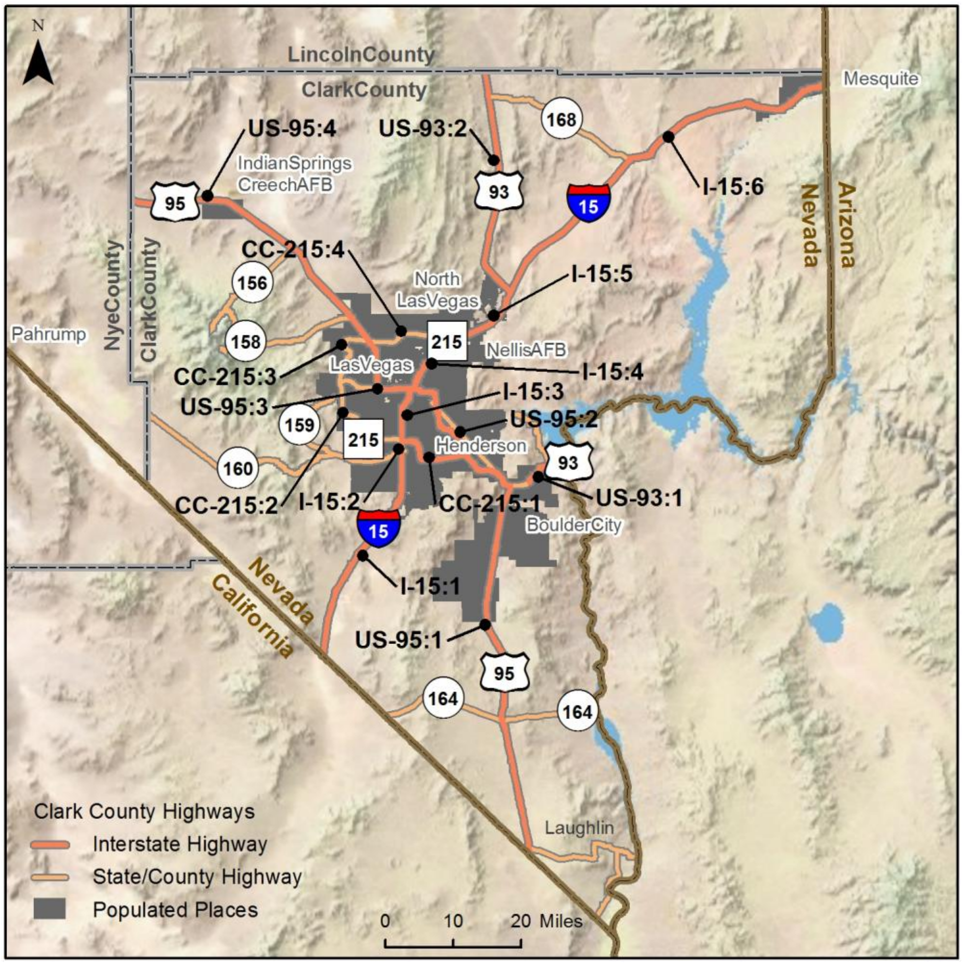


Table 6.1 and 6.2 shows the estimate for total highway use on these selected segments and the proportions of that total for truck use in 2005 and 2008. These NDOT estimates can be incorporated into future assessment studies to examine all county highway segments with a detailed breakdown by light and heavy truck.

Table 6.1: Total AVMT and Truck Portions for Selected Clark County Segments, 2005

Segment	Total AVMT	Light Truck AVMT	Light Truck %	Heavy Truck AVMT	Heavy Truck %	Total Truck AVMT
I-15:1	595,572,690	7,146,872	1.20%	27,396,344	4.60%	34,543,216
I-15:2	48,810,720	829,782	1.70%	2,538,157	5.20%	3,367,940
I-15:3	665,197,900	11,308,364	1.70%	34,590,291	5.20%	45,898,655
I-15:4	264,245,218	4,492,169	1.70%	13,740,751	5.20%	18,232,920
I-15:5	124,839,892	3,495,517	2.80%	14,731,107	11.80%	18,226,624
I-15:6	418,671,206	22,608,245	5.40%	81,640,885	19.50%	104,249,130
US 95:1	192,416,539	5,387,663	2.80%	50,413,133	26.20%	55,800,796
US 95:2	716,925,262	32,261,637	4.50%	84,597,181	11.80%	116,858,818
US 95:3	34,229,116	342,291	1.00%	513,437	1.50%	855,728
US 95:4	59,852,061	1,017,485	1.70%	1,795,562	3.00%	2,813,047
US 93:1	69,793,986	1,884,438	2.70%	767,734	1.10%	2,652,171
US 93:2	160,373,043	9,141,263	5.70%	29,508,640	18.40%	38,649,903
CC215	488,530,965	5,373,841	1.10%	10,259,150	2.10%	15,632,991

Source: NDOT, 2007b.

Table 6.2: Total AVMT and Truck Portions for Selected Clark County Segments, 2008

Segment	Total AVMT	Light Truck AVMT	Light Truck %	Heavy Truck AVMT	Heavy Truck %	Total Truck AVMT
I-15:1	626,590,390	5,138,041	0.82	81,832,705	13.06	86,970,746
I-15:2	66,097,850	898,931	1.36	4,269,921	6.46	5,168,852
I-15:3	707,282,035	9,619,036	1.36	45,690,419	6.46	55,309,455
I-15:4	268,071,695	13,912,921	5.19	31,927,339	11.91	45,840,260
I-15:5	108,126,140	5,611,747	5.19	12,877,823	11.91	18,489,570
I-15:6	396,171,365	6,616,062	1.67	75,827,199	19.14	82,443,261
US 95:1	175,825,647	4,729,710	2.69	43,200,361	24.57	47,930,071
US 95:2	817,123,310	5,229,589	0.64	9,723,767	1.19	14,953,356
US 95:3	732,579,382	10,475,885	1.43	5,274,572	0.72	15,750,457
US 95:4	102,352,205	1,627,400	1.59	9,692,754	9.47	11,320,154
US 93:1	74,305,240	832,219	1.12	1,983,950	2.67	2,816,169
US 93:2	25,949,639	529,373	2.04	7,481,281	28.83	8,010,654
CC 215:1	569,896,765	478,713	0.084	7,807,586	1.37	8,286,299
CC 215:2	485,747,840	11,220,775	2.31	12,483,719	2.57	23,704,494
CC 215:3	125,608,910	3,441,684	2.74	2,889,004	2.30	6,330,688
CC 215:4	99,582,220	2,728,553	2.74	2,290,391	2.30	5,018,944

Source: NDOT, 2010

The estimate of travel on these Clark County highways for 2005 and 2008 showed a very large volume for the combined flow of US 93 and US 95 entering Las Vegas from the south. The heavy truck utilization ratio on US 95 from California for both data years is about 25% of all traffic on this segment before it combines with the traffic from over Hoover Dam on US 93. With the heavy truck utilization ratio similarly high on I-15 as it exits the county to the north, it would appear most of the heavy truck traffic through the county originating in California prefers this route.

3.2 Highway Accidents

The second main component of this examination is the presentation of highway accident data. Information on the nation's highway accident fatalities maintained by the Volpe Center is now available from web-based queries for national and state components (NHTSA, 2010b) and special reports that provide county-level data (NHTSA, 2010c). Table 7 presents total fatalities from 1994 to 2008 for the nation, Nevada, and Clark County. The sharp increases in traffic fatalities in Nevada and Clark County are partly explained by the overall growth in the state and Clark County population during this time.

Table 7: Total Fatalities, 1994-2008

	Clark County	Nevada	U.S.
1994	150	294	40716
1995	174	313	41817
1996	214	348	42065
1997	200	347	42013
1998	203	361	41501
1999	195	350	41717
2000	188	323	41945
2001	189	314	42196
2002	231	381	43005
2003	223	368	42884
2004	247	395	42836
2005	265	427	43443
2006	282	431	42708
2007	248	373	41259
2008	201	324	37261
Change 1994 - 2008	34.0%	10.2%	-8.5%

Source: NHTSA

Table 8 and Figure 2 present accident rates for the nation and Nevada for the same time period. Rates for 2008 are not yet presented because of additional computations and adjustments in progress related to AVMT estimates. The NHTSA online reports do not include a fatality estimate for geographical units smaller than state-level. A simple calculation of the total AVMT reported by NDOT for Clark County and total fatalities for Clark County reported by the NHTSA yields a fatality rate for Clark County of 1.46 per 100 million miles traveled. We do not have sufficient data at this time to calculate fatality rates for trucks, although ongoing efforts to calculate this rate will likely be available for incorporation into future risk assessments.

Table 8: Fatalities - Rate per 100 Million Miles Traveled, 1994 - 2008

	Nevada	**U.S.**
1994	2.26	1.73
1995	2.24	1.73
1996	2.18	1.69
1997	2.13	1.64
1998	2.19	1.58
1999	2.01	1.55
2000	1.83	1.53
2001	1.72	1.51
2002	2.12	1.51
2003	1.91	1.48
2004	1.95	1.44
2005	2.06	1.46
2006	1.97	1.42
2007	1.68	1.36
2008	N/A	N/A

Source: NHTSA

Fatality rates on the Nation's highways have experienced a gradual decline over the previous decade. In Nevada, a similar decline was evident through 2001, but then shows a sharp increase and considerable fluctuation in the past three years. It is not clear from these numbers if this is a data quality issue or if, indeed, Nevada's highways are much more dangerous than highways in other parts of the country. Estimates for highway fatalities on Clark County highways were not available at the time of this report. Efforts to include these estimates for Clark County, and truck-related portions of the total accidents, will be required for the future effort of risk analysis.

As indicated previously, the Volpe Center maintains data regarding motor carrier accidents at the national level (Volpe, 2007) and at the state level (Volpe, 2007b). Information on fatalities is more complete from FARS, while injury accidents are found in MCMIS. Table 9 presents large truck accident totals for the nation and Nevada from 2001 through 2008. Fatality data for the nation are presented in black while the gray colored estimates are for Nevada.

Figure 2

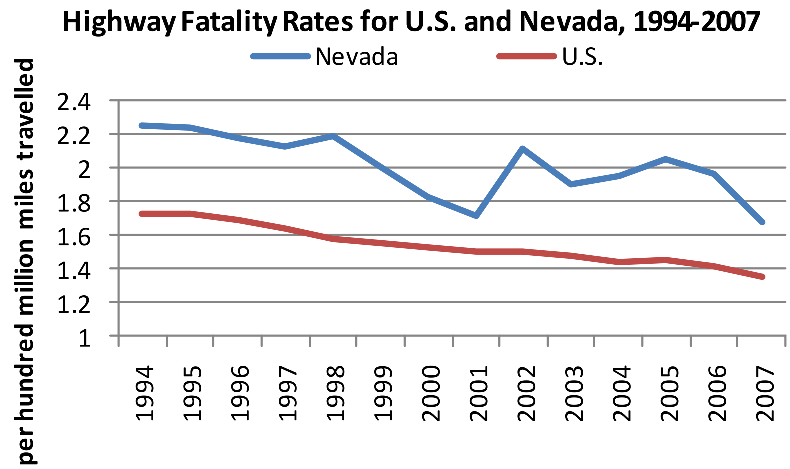


Table 9: Large Trucks Involved in Crashes for the U.S. and Nevada, 2001 - 2008

Number of Large Trucks Involved in:	2001	2002	2003	2004	2005	2006	2007	2008
Fatal and Non-Fatal Crashes (FARS + MCMIS)	109,530 581	116,592 588	127,734 605	139,349 579	147,204 649	147,155 594	147,726 568	133,719 618
Fatal Crashes (FARS)	4,823 44	4,587 33	4,721 36	4,902 28	4,951 48	4,766 43	4,633 25	4,066 21
Fatal Crashes (MCMIS)	4,541 37	4,429 34	4,459 36	4,848 23	5,240 49	4,966 45	4,810 27	4,211 21
Non-Fatal Crashes (MCMIS)	104,707 537	112,005 555	123,013 569	134,447 551	142,253 601	142,389 551	143,093 543	129,653 597
Injury Crashes (MCMIS)	50,072 263	55,613 271	58,522 272	60,800 289	61,777 284	60,251 181	58,093 186	51,680 188
Tow Away Crashes (MCMIS)	54,635 274	56,392 284	64,491 297	73,647 262	80,476 317	82,138 370	85,000 357	77,973 409
HM Placard Crashes (FARS & MCMIS)	1,981 15	1,854 17	2,187 15	2,453 5	2,574 4	2,278 3	2,297 4	2,641 8
Number of Fatalities (FARS)	5,111 46	4,939 32	5,036 32	5,235 29	5,240 53	5,027 51	4,822 29	4,229 22
Injuries (MCMIS)	76,415 425	85,858 448	89,262 451	85,028 411	86,642 438	84,201 249	80,104 265	71,329 248

Source: FMCSA, 2008.

County level estimates are not currently available from these databases. However, accident data on Clark County highways is available from the Nevada State Police. While these data are not currently amenable to analysis at this time, an effort to estimate the number of crashes in the county will be required prior to conducting a risk assessment. The same reports for large truck accidents provide additional information on accidents related to trucks carrying hazardous cargoes and accidents resulting in the release of hazardous cargoes (Volpe, 2007c).

Tables 10.1 and 10.2 present fatal and non-fatal truck accidents for the nation and Nevada, for 2005 and 2008 respectively. It also includes what proportion of those accidents involved truck carrying HAZMAT placards. Note that data in these reports are less complete than the broad categories unrelated to shipments of hazardous commodities.

Table 10.1: U.S. and Nevada Large Truck Accidents with HAZMAT Present, 2005

HAZMAT Placard	Fatal USA Total	Fatal Nevada Total	Non-Fatal USA Total	Non-Fatal Nevada Total
Placard Not Present	4652 (94.3%)	47 (95.9%)	102628 (73.4%)	
Placard Present	186 (3.8%)	1 (2.0%)	2185 (1.6%)	4 (0.7%)
Unknown	94 (1.9%)	1 (2.0%)		
Missing			34959 (25.0%)	598 (99.3%)
Total	4932	49	139772	602

Source: FMCSA, 2008

Table 10.2: U.S. and Nevada Large Truck Accidents with HAZMAT Present, 2008

HAZMAT Placard	Fatal USA Total	Fatal Nevada Total	Non-Fatal USA Total	Non-Fatal Nevada Total
Placard Not Present	2479 (58.9%)		79,046 (61.0%)	
Placard Present	132 (3.1%)		2,509 (1.9%)	8 (1.3%)
Unknown				
Missing	1600 (38.0%)	21	48,098 (37.1%)	589 (98.7%)
Total	4,211	21	129,653	597

Source: FMCSA, 2008

Accidents involving the release of hazardous cargoes are of more interest for this study. Unfortunately, these data are even less complete for Nevada, and include no estimates for Clark County. Table 11.1 presents national estimates for HAZMAT releases resulting from large truck accidents and very limited information of such crashes in Nevada. Prior to conducting a risk analysis, the rates of HAZMAT accidents and HAZMAT releases will need to be supplemented with state and county estimates.

Table 11.1: U.S. and Nevada Large Truck Accidents with HAZMAT Releases, 2005

Cargo Release	Fatal USA Total	Fatal Nevada Total	Non-Fatal USA Total	Non-Fatal Nevada Total
No	61 (54.5%)		1626 (74.4%)	
Yes	33 (29.5%)		265 (12.1%)	
Missing	18 (16.1%)		294 (13.5%)	4 (100%)
Total	**112**		**2,185**	**4**

Source: FMCSA, 2008

Table 11.2: U.S. and Nevada Large Truck Accidents with HAZMAT Releases, 2008

Cargo Release	Fatal USA Total	Fatal Nevada Total	Non-Fatal USA Total	Non-Fatal Nevada Total
No	81 (61.4%)		1789 (71.3%)	
Yes	30 (22.7%)		312 (12.4%)	1 (12.5%)
Missing	21 (15.9%)		408 (16.3%)	7 (87.5%)
Total	**132**			**8**

Source: FMCSA, 2008

The final pertinent data element extracted from the FMCSA data is the estimate for class of hazardous commodity released from large truck accidents. Table 12.1 and 12.2 provides that estimate for the nation, but includes no estimates for the state or county. Again, prior to conducting a risk assessment, estimates for truck accidents with hazardous cargo releases in Nevada and Clark County will be required. With estimates for highway use and highway accidents assembled and presented, we now move to the discussion of the movement of hazardous commodities by truck.

Table 12.1: U.S. Large Truck Accidents with HAZMAT Release by HAZMAT Class, 2005

Class of Leakage	Fatal USA Total	Non-Fatal USA Total
Explosives		9 (3.4%)
Gases	6 (18.2%)	29 (10.9%)
Flammable Liquid	13 (39.4%)	112 (42.3%)
Flammable Solids		3 (1.1%)
Oxidizing Substances	2 (6.1%)	7 (2.6%)
Poison & Infectious Substances		2 (0.8%)
Radioactive Material		1 (0.4%)
Corrosives	2 (6.1%)	22 (8.3%)
Miscellaneous Dangerous Goods	1 (3.0%)	23 (8.7%)
Missing	9 (27.3%)	57 (21.5%)
Total	**33**	**265**

Source: FMCSA Crash Statistics, 2008

Table 12.2: U.S. Large Truck Accidents with HAZMAT Release by HAZMAT Class, 2008

Class of Leakage	Fatal USA Total	Non-Fatal USA Total
Explosives	1 (3.3%)	16 (5.1%)
Gases	4 (13.3%)	29 (9.3%)
Flammable Liquids	17 (56.7%)	140 (44.9%)
Flammable Solids		7 (2.2%)
Oxidizing Substances		8 (2.6%)
Poisonous and Infectious Substances		1 (0.3%)
Radioactive		1 (0.3%)
Corrosives	4 (13.3%)	28 (9%)
Miscellaneous Dangerous Goods	4 (13.3%)	32 (10.3%)
Unknown		50 (16%)
Total	**30**	**312**

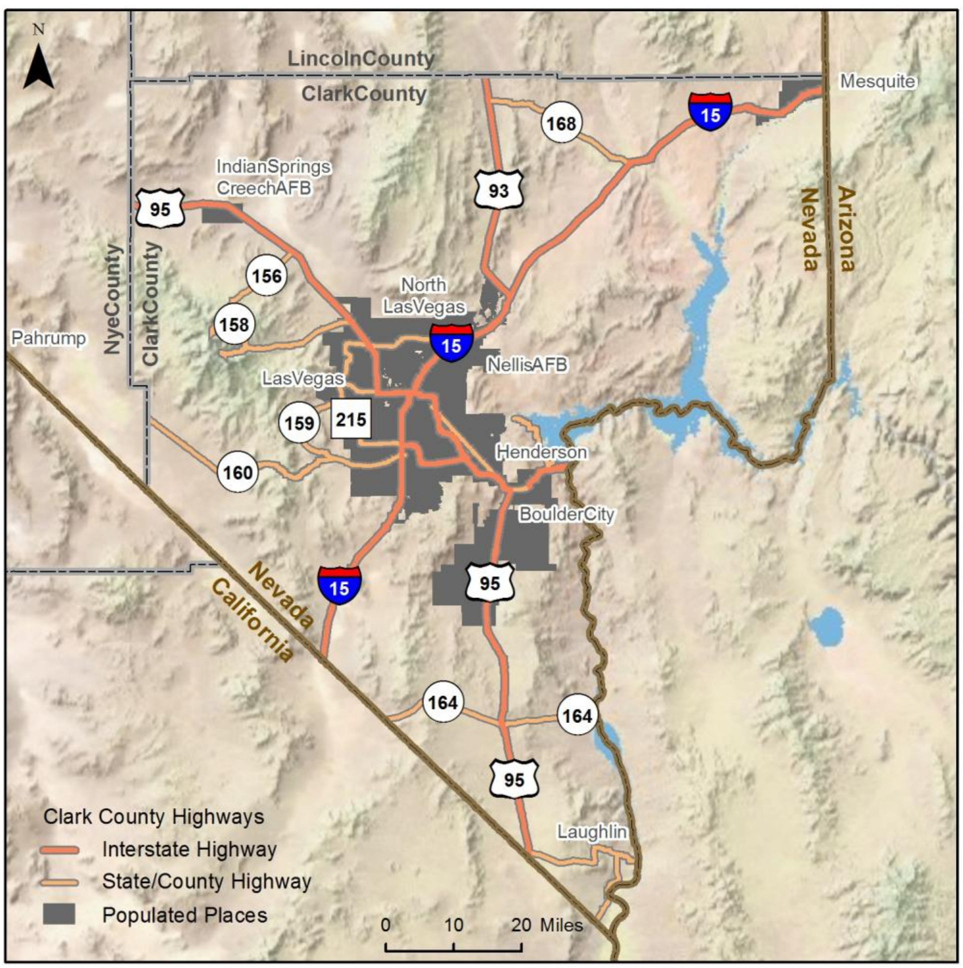
Source: FMCSA Crash Statistics, 2008

3.3 Hazardous Commodity Flows by Truck in Clark County

As previously indicated, estimates of truck shipments of hazardous substances in Clark County are found in TRANSEARCH data (Global Insight, 2009). These data are not information about cargoes on individual trucks, but a mathematical model representing flows between senders and receivers in commodity chains. Given a certain amount of data about industrial location and shipments of raw materials and finished products, accurate predictions of where those commodities will flow is possible. Care must be taken to remember these numbers represent estimates of network flows on a given segment, not deliveries to specific locations. Characterizing these flows by highway segment and tabulating them for further evaluation is the objective of this report.

The potential HAZMAT flow network includes all designated Interstate, U.S., and state highway segments (Figure 3). Flows of HAZMAT in Clark County occur on the primary U.S. and Interstate highways, but also include a somewhat curious anomaly. Short segments of the Las Vegas Strip (SR 604) and of Charleston Blvd are included in the routing of HAZMAT in Clark County. These data include intermodal flows, and this segment connects the highway and rail networks in the transfer of HAZMAT

Figure 3: Route Potential for Truck HAZMAT Flows – Clark County, 2008



between modes. This intermodal transfer facility has since been relocated north of the metro area. An important component of the analysis of HAZMAT transported by truck regards origin and destination of shipments. Flows traveling through the county do not require any handling (loading or unloading) which minimizes accidents or incidents related to handling. On the other hand, local flows include loading as well as unloading of the cargo and raise the risk of handling accidents. The flow estimates for 2005 and 2008 related to routing are presented on Figure 4.1 and 4.2. A decrease is observed in 2008 through flows when compared to 2005. While Through flow tons accounted for about 70% of total tons for Clark County, this reduced to 55.6% in 2008. The recent economic slump in the country may be speculated as a reason for the reduced volume of transported commodities.

Figure 4.1

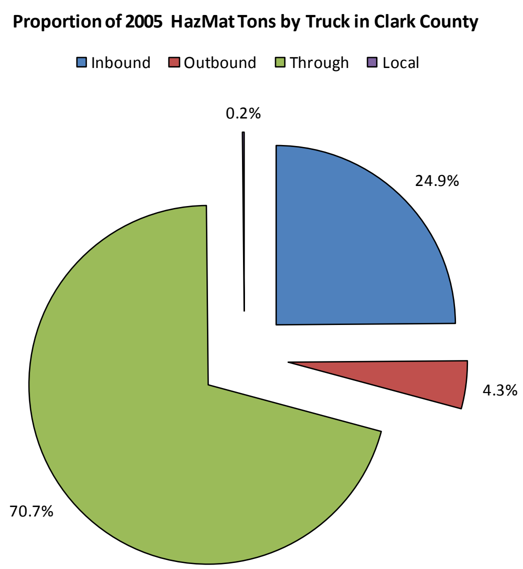


Figure 4.2

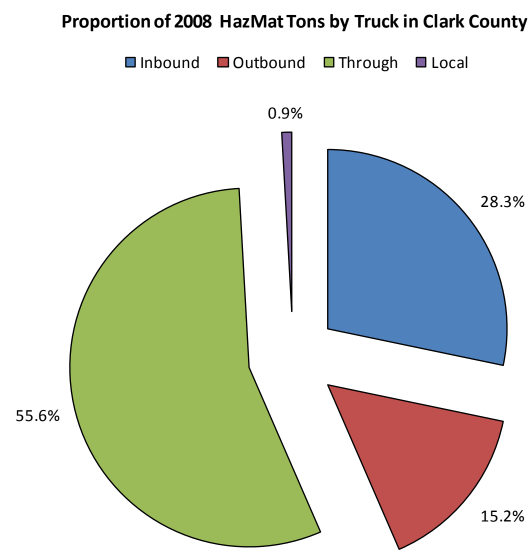


Figure 4.3

Direction	Tons (2005)	Tons (2008)	Loads (2005)	Loads (2008)	% Tons (2005)	% Tons (2008)	% Loads (2005)	% Loads (2008)
Inbound	1,473,659	752,464	61,915	33,460	24.9%	28.3%	22.5%	26.9%
Outbound	255,328	404,884	12,190	16,424	4.3%	15.2%	4.4%	13.2%
Through	4,185,906	1,481,020	200,309	73,717	70.7%	55.6%	72.9%	59.2%
Local	9,455	23,727	422	945	0.2%	0.9%	0.2%	0.8%
Total	**5,924,348**	**2,662,094**	**274,836**	**124,546**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Comparative Statistical Analysis of Truck Commodities

There was a statistically significant Pearson Correlation between the years 2005 and 2008 with a high correlation coefficient of .83, $p < .0001$, indicating an increase in one year was associated with an increase in the other. In addition, there were percent changes per year with regards to hazardous material. Specifically, decreases from 2005 to 2008 include: Division 1.3 Explosives (-41.36%); Division 1.4 & 1.5 Explosives (-50.55%); Division 2.1 Flammable Gases (-20.75%); Division 2.2 Nonflammable Gases & Gas Mixtures (-44.78%); Division 2.3 Poisonous or Corrosive Gases (-88.01%); Class 3 Flammable Liquids (-46.56%); Combustible Liquids (-75.96%); Division 4.1 Flammable Solids (-7.11%); Division 4.2 Spontaneously Combustible & 4.3 Dangerous when Wet (-13.12%); Division 5.1 Oxidizers (-60.52%); Division 5.2 Organic Peroxides (-97.67%); Division 6.1 Poisonous Material, Hazard Zone A (-92.83%); Division 6.1 Poisonous Material, Other Commodities (-56.09%); Division 6.1 Poisonous Material, Packing Group III (-63.48%); Division 6.2 Etiologic Agents, Infectious Substances (-20.10%); Class 7 Radioactive Materials (-12.19%); Class 8 Corrosive Materials (-79.99%); Class 9 Environmentally Hazardous, Other Commodities (-16.68%); Division 9.1 Environmentally Hazardous Commodities (-80.28%); Division 9.2 Environmentally Hazardous Commodities (-31.70%); Freight All Kinds, Hazardous Materials (-66.23%); and ORM-D (-92.66%). Conversely, the only increase from 2005 to 2008 includes Division 1.1 & 1.2 Hazardous Materials (117.07%). While approaching significance, there was not a statistically significant difference between the years on tons of hazardous material, $F(1,44) = 2.54$, $p = .12$, with the mean of 2005 being higher ($M = 257{,}580.33$) than 2008 ($M = 115{,}743.22$) when all types of hazardous material were taken into account. In addition, when the only material with an increase was taken out (Division 1.1 & 1.2 Hazardous Materials (117.07%)), the difference in years remained at the same statistical significance level indicating no statistically significant difference between years on hazardous material, $F(1, 42) = 2.59$, $p = .12$, with the mean of 2005 being higher ($M = 269{,}237.68$) than 2008 ($M = 120{,}893.91$).

Transportation of HAZMAT by truck in Clark County is dominated by the flow through the state. Almost three-quarters of the HAZMAT highway flow in Clark County passes through Nevada. Inbound hazardous commodities heavily outweigh the export of HAZMAT from Clark County. This ratio mirrors the general flow of commodities throughout the state (NDOT, 2000). As shown in the characterization by commodity class, liquid and gaseous fuels dominate the highway flows. The consumption of fuels locally for heating and transportation explains the differential between import and export. Local flows within the county contribute a minor portion of the regulated flows; however the CALNEV pipeline does deliver approximately 128,000 barrels per day of diesel, gasoline and jet fuel into the valley to the Kinder Morgan fuel depot, where it is further distributed locally.

Table 13: Truck HAZMAT Tons and Loads by HM Class and Division – Clark County, 2005 and 2008

Hazardous Commodity Description	Truck Tons (2005)	Truck Tons (2008)	Truck Loads (2005)	Truck Loads (2008)
Division 1.1 & 1.2 Hazardous Materials	1,119	2,428	53	112
Division 1.3 Explosives	11,482	6,733	818	459
Division 1.4 & 1.5 Explosives	840	415	41	20
Division 2.1 Flammable Gases	870,685	689,954	37,972	32,487
Division 2.2 Nonflammable Gases & Gas Mixtures	174,320	96,259	8,980	5,060
Division 2.3 Poisonous or Corrosive Gases	260,640	31,253	12,809	1,559
Class 3 Flammable Liquids	1,297,187	693,267	61,580	33,187
Combustible Liquids	239,839	57,667	10,385	2,568
Division 4.1 Flammable Solids	218,012	202,503	8,691	8,009
Division 4.2 Spont. Combustible & 4.3 Dangerous when Wet	234,799	204,015	9,403	8,072
Division 5.1 Oxidizers	218,217	86,155	10,750	4,266
Division 5.2 Organic Peroxides	72	2	4	0
Division 6.1 Poisonous Material, Hazard Zone A	735	53	36	3
Division 6.1 Poisonous Material, Other Commodities	93,279	40,963	4,478	1,960
Division 6.1 Poisonous Material, Packing Group III	50,445	18,423	2,479	909
Division 6.2 Etiologic Agents, Infectious Substances	14,449	11,545	651	525
Class 7 Radioactive Materials	13,831	12,145	744	682
Class 8 Corrosive Materials	1,136,606	227,377	56,360	12,294
Class 9 Environmentally Hazardous, Other Commodities	59,685	49,729	2,935	2,233
Division 9.1 Environmentally Hazardous Commodities	779,767	153,754	33,581	6,693
Division 9.2 Environmentally Hazardous Commodities	90,117	61,550	4,279	2,685
Freight All Kinds, Hazardous Materials	16,236	5,484	779	257
ORM-D	141,986	10,419	7,029	507
Total	**5,924,348**	**2,662,094**	**274,836**	**124,546**

Bulk materials such as flammable liquids, flammable gases, and corrosive materials dominated the distribution of HAZMAT truck cargoes in Clark County both in 2005 and 2008. Fuels in liquid and gaseous form account for much of the tonnage moving in and through the County. Class 8 cargoes of corrosive substances are important in tonnage and by the number of loads. This class of cargo is primarily industrial chemicals used in manufacturing, and most moves through the County to other destinations. The movement of highly toxic and dangerous commodities is relatively minor, but increases the potential for and probability of disastrous accident results.

As shown on Figure 5.1 and 5.2, volumes of hazardous substances moving by truck on Clark County highways are dominated by four major categories. Class 3 Liquids (flammable and combustible) accounts for over a quarter of the total tons shipped (25.9% in 2005 and 28.2% in 2008), followed by Class 2 Gases

(22%) in 2005. In 2008, Class 2 Gases accounted for over 30% of the total tons shipped thus becoming the highest volume of commodity class transported in that year. Class 8 Corrosive Materials saw a steep decline from 19.2% in 2005 to 8.5% in 2008, and Class 9 Miscellaneous Dangerous Goods also decreased from18.4% to 10.6%.

Distribution by class of HAZMAT showed movements of Class 3 (flammable liquids and combustible liquids) as the highest volume of flow in the County in 2005. However, in 2008 the highest volume of flow was dominated by Class 2 (Gases) with Class 3 a close second. Gasoline and liquid fuels make up the bulk of Class 3 commodities and it dominates bulk flows in most metropolitan areas dependant on the automobile. The bulk of industrial chemicals and commodities represented by the remaining important classes by volume Class 8 (corrosive commodities) and Class 9 (environmentally hazardous and other hazardous commodities) rise to considerable volume for both years. Cargoes of explosives and radioactive commodities are relatively miniscule in 2005 as well as 2008.

Figure 5.1

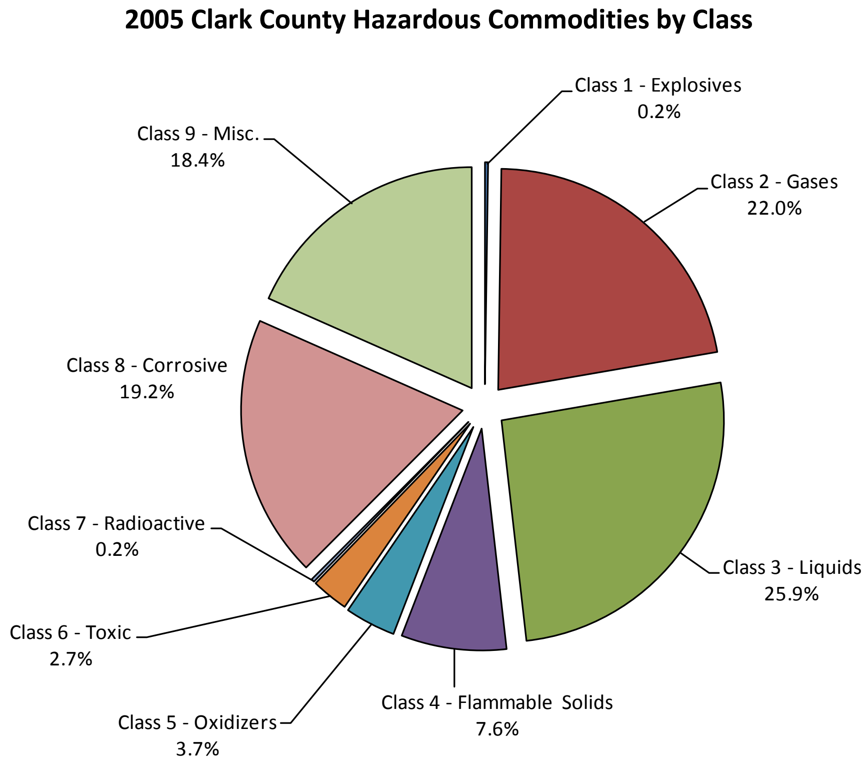


Figure 5.2

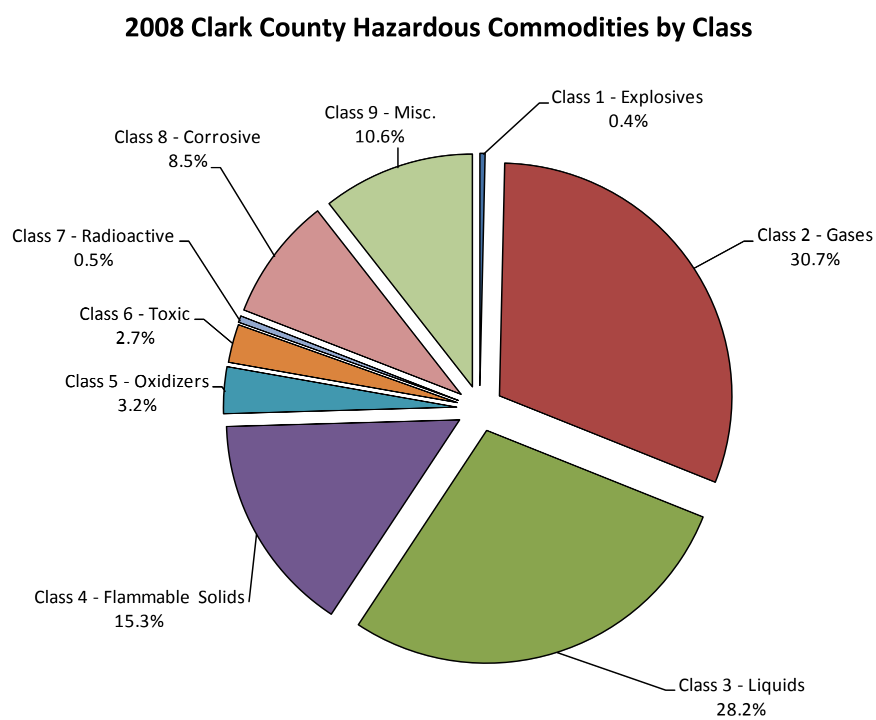
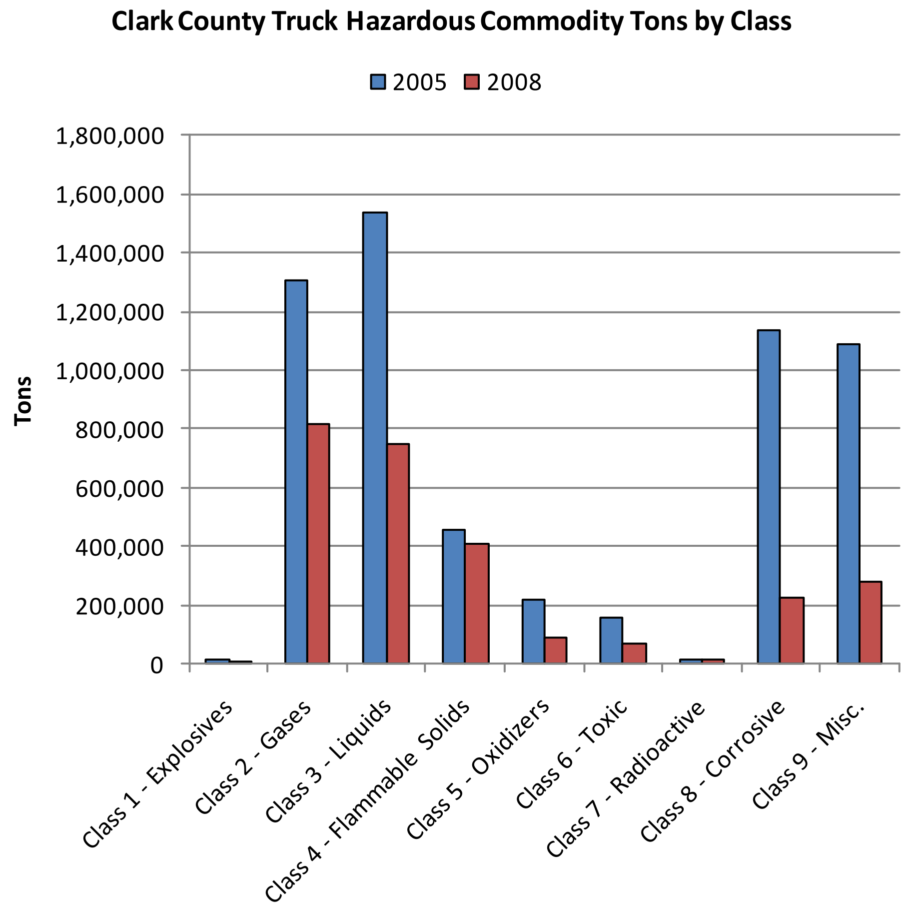


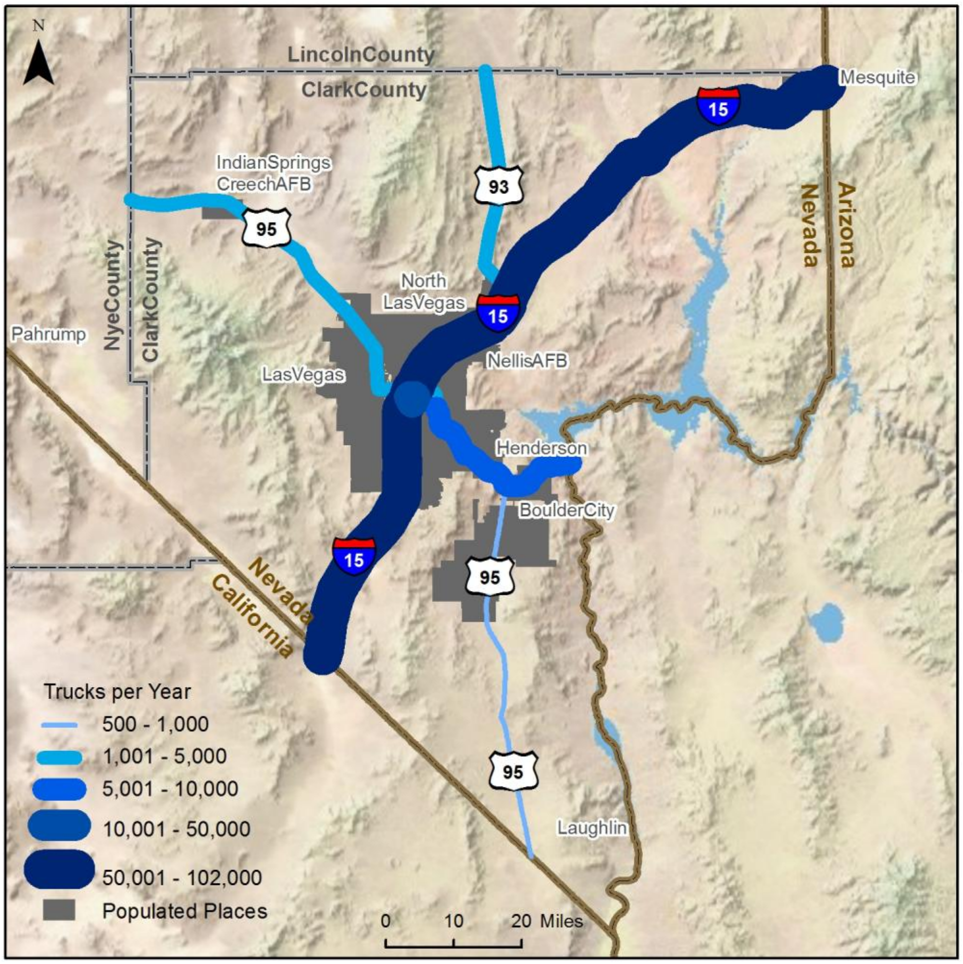
Figure 6.1



Over 1.5 million tons of Class 3 flammable and combustible liquids traveled Clark County highways in 2005. However, in 2008 this quantity reduced to almost half at 750,934 tons. There were greater than one million tons of Class 2 gases, Class 8 corrosive materials, and Class 9 hazardous cargoes moved by truck on county highways in 2005. All of these significantly decreased in 2008 with Class 8 corrosives and Class 9 (Miscellaneous) showing a steep drop to less than a third of their 2005 tonnage amount.

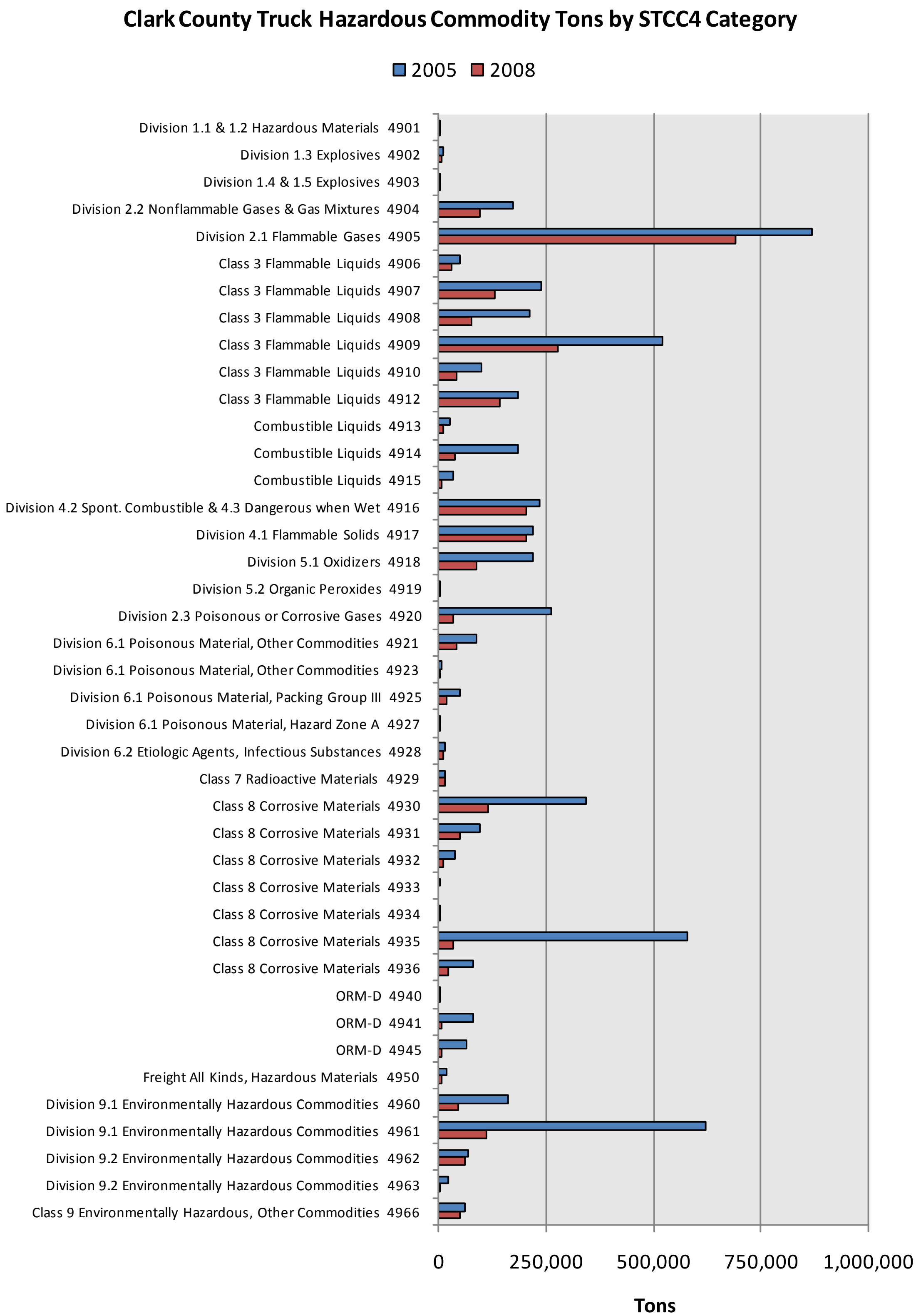
As shown in Figure 6.2, the majority of hazardous materials trucks moving through Clark County travel the main north/south corridor on Interstate 15. This route is one of the primary connectors from the shipping ports in southern California to the central United States. Smaller volumes of truck traffic utilize State Highway 95 and 93, where they intersect the Las Vegas metropolitan area.

Figure 6.2: HAZMAT Truck Volume on Clark County Highways



To provide a more detailed view of truck shipments by STCC commodity, Figure 7 provides a breakdown and ranks categories by total tons, comparing 2005 STCC4 category tons to 2008 estimates. Division 2.1 Flammable gases (includes liquefied petroleum and propane) was the largest single commodity in 2005 and in 2008. The second and third ranking categories in 2008 were Class 3 Flammable Liquids and Division 4.2 Spontaneously Combustible & 4.3 Dangerous when Wet. A detailed presentation of total tons and total loads is provided in Appendix B for each STCC4 hazardous materials group, comparing 2005 and 2008.

Figure 7


Clark County Truck Hazardous Commodity Tons by STCC4 Category
2005
2008
Division 1.1 & 1.2 Hazardous Materials 4901
Division 1.3 Explosives 4902
Division 1.4 & 1.5 Explosives 4903
Division 2.2 Nonflammable Gases & Gas Mixtures 4904
Division 2.1 Flammable Gases 4905
Class 3 Flammable Liquids 4906
Class 3 Flammable Liquids 4907
Class 3 Flammable Liquids 4908
Class 3 Flammable Liquids 4909
Class 3 Flammable Liquids 4910
Class 3 Flammable Liquids 4912
Combustible Liquids 4913
Combustible Liquids 4914
Combustible Liquids 4915
Division 4.2 Spont. Combustible & 4.3 Dangerous when Wet 4916
Division 4.1 Flammable Solids 4917
Division 5.1 Oxidizers 4918
Division 5.2 Organic Peroxides 4919
Division 2.3 Poisonous or Corrosive Gases 4920
Division 6.1 Poisonous Material, Other Commodities 4921
Division 6.1 Poisonous Material, Other Commodities 4923
Division 6.1 Poisonous Material, Packing Group III 4925
Division 6.1 Poisonous Material, Hazard Zone A 4927
Division 6.2 Etiologic Agents, Infectious Substances 4928
Class 7 Radioactive Materials 4929
Class 8 Corrosive Materials 4930
Class 8 Corrosive Materials 4931
Class 8 Corrosive Materials 4932
Class 8 Corrosive Materials 4933
Class 8 Corrosive Materials 4934
Class 8 Corrosive Materials 4935
Class 8 Corrosive Materials 4936
ORM-D 4940
ORM-D 4941
ORM-D 4945
Freight All Kinds, Hazardous Materials 4950
Division 9.1 Environmentally Hazardous Commodities 4960
Division 9.1 Environmentally Hazardous Commodities 4961
Division 9.2 Environmentally Hazardous Commodities 4962
Division 9.2 Environmentally Hazardous Commodities 4963
Class 9 Environmentally Hazardous, Other Commodities 4966
0
250,000
500,000
750,000
1,000,000
Tons

Top categories in terms of highest tonnage are shown above to illustrate the different volumes of individual HAZMAT commodities and different routing within the county. Figure 8.1 and 8.2 show the characteristics of the truck movements of HAZMAT category 4905. The Through flows of this category decreased in 2008, while the inbound flows showed a sharp increase. Large volumes of this cargo pass through the County to other destinations and large volumes flow into the County for consumption. Very little outbound or local flows were present in 2005 and 2008. Class 3 Flammable Liquids also show very large volumes of flow (Figure 9.1 and 9.2), but are mostly traveling through the County. While there was also substantial tons of this commodity arriving inbound and exported to other locations, the main movements passed through Clark County. A detailed presentation of routing, total tons, and total loads is provided in Appendix C for each STCC4 hazardous materials group, comparing 2005 and 2008.

Figure 8.1: Division 2.1 Flammable Gases 4905 (2005 Tons)

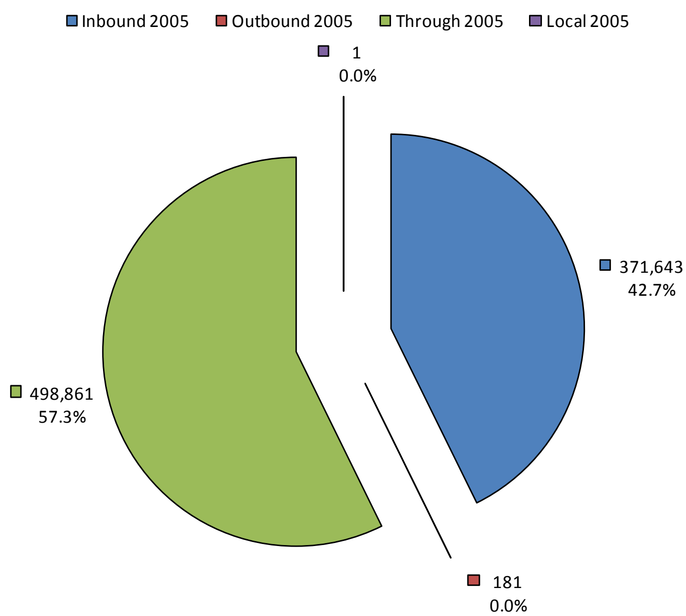


Figure 8.2: Division 2.1 Flammable Gases 4905 (2008 Tons)

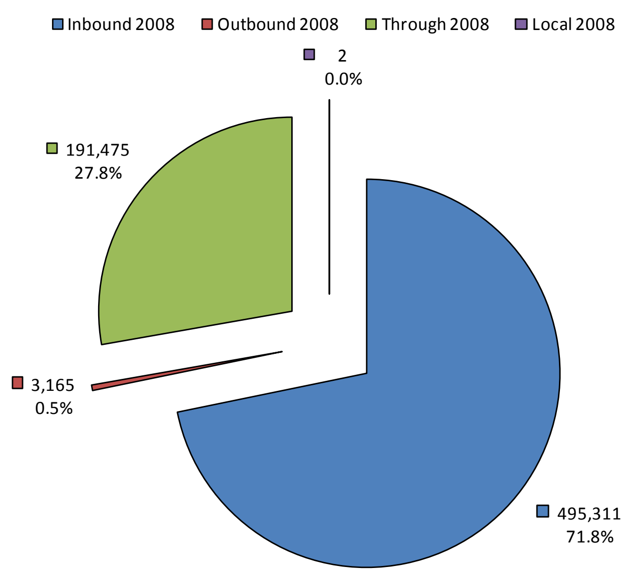


Figure 9.1: Class 3 Flammable Liquids 4909 (2005 Tons)

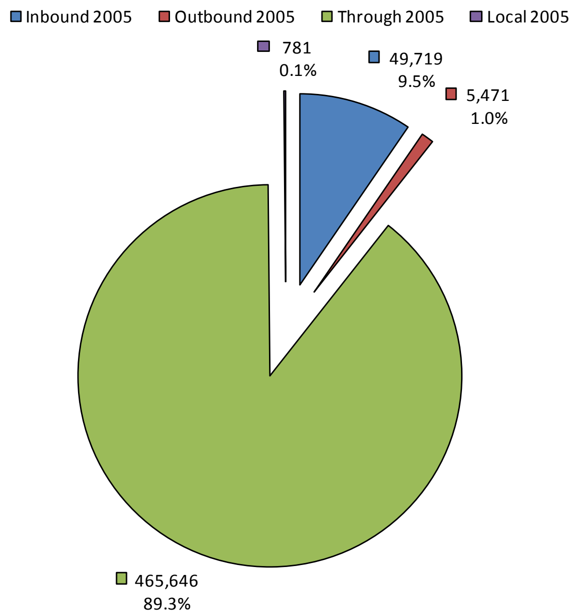
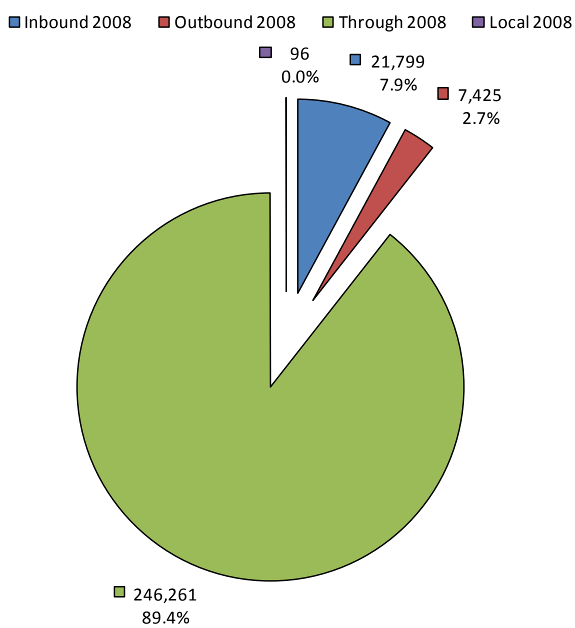


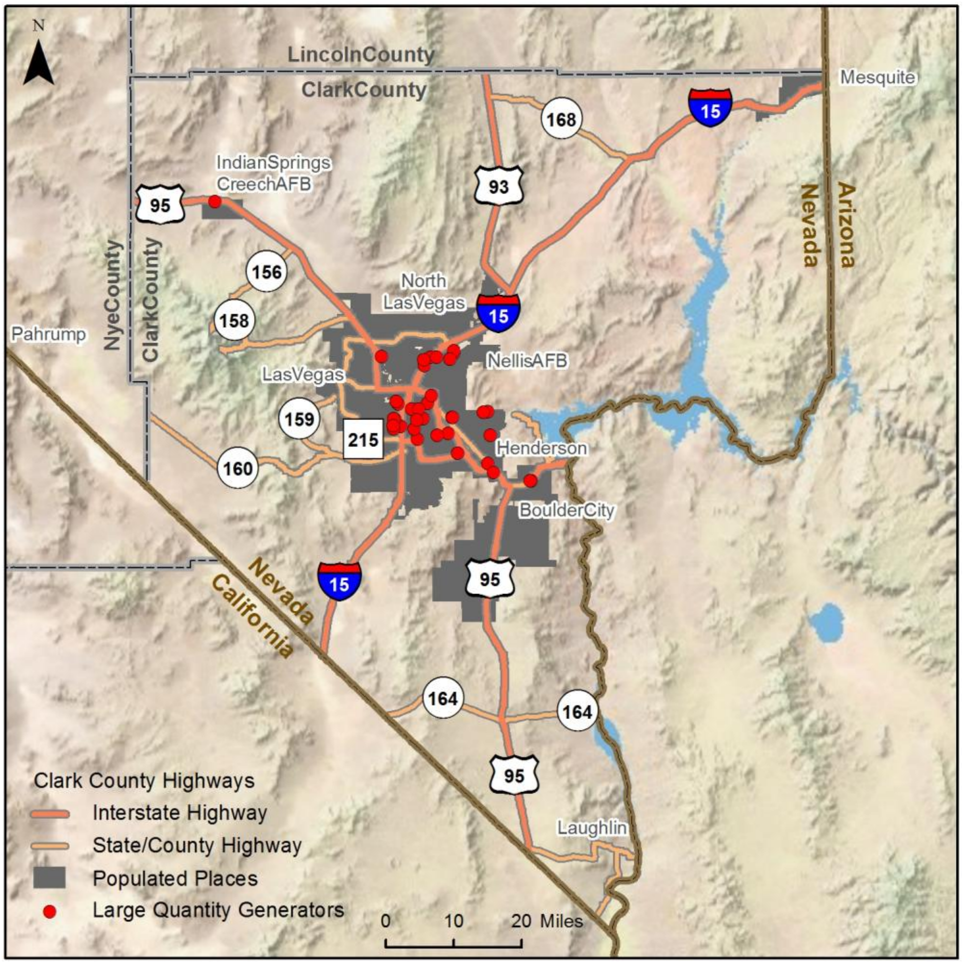
Figure 9.2: Class 3 Flammable Liquids 4909 (2008 Tons)



3.4 Large Quantity Generators in Clark County

As indicated previously, very little detail is available in the flow data regarding local geography. In an attempt to provide some explanation where these commodities may be traveling to or from within Clark County, we gathered information from the Environmental Protection Agency database regarding the location of certain facilities within the County. Figure 10 shows the locations of these facilities in Clark County, including Creech Air Force Base in Indian Springs near the Nye County line.

Figure 10: Large Quantity Generators - Clark County



Most of these facilities are located well over a mile from the highway network. Obviously, there are local flows of these commodities not captured in the TRANSEARCH data. At this point, we would hesitate to draw any conclusions about this distribution other than to note that information related to local flows is lacking. There are additional facilities, known as Small Quantity Generators, also found in the same EPA database. A more thorough investigation of these facilities and the materials they handle, transport, and store will add to the knowledge of the movements of hazardous materials in Clark County.

4.0 CONCLUSIONS AND RECOMMENDATIONS

While the economy of Clark County is diversifying, tourism remains the primary sector. This sector has been shown to be particularly vulnerable to stigma-related impacts such as those associated with hazardous material accidents (UER, 2002). Although the nature of the local economy is service-related, large quantities of hazardous materials travel by truck on County highways. Details about local flows removed from the highway network are practically non-existent. Estimating these local flows will be a formidable task.

We have assembled and presented results for commodity flows by motor carriers required to comply with federal regulations regarding commercial movements of these goods. Private motor carriers and private shipments of these commodities are not as well-regulated and experience little documentation. Distribution of quantities below certain quantities to retail outlets for private purchase and consumption are not regulated and reported at all. Attaining an estimate of the total flow of these commodities is probably not realistic.

Several examples of such unregulated flows are readily available. Garbage trucks carry mixed loads of hazardous waste from households to our city and county landfills every day. Insecticides, paint, household chemicals, and obsolete computers and electrical components all contain chemicals and compounds that are regulated for commercial motor carriers. These items are of interest to certain elements of government, but movements are not regulated beyond local ordinances.

The distribution of gasoline to retail outlets is an example of large volume movements that are also missed by this and similar studies. Movements between distributors and wholesalers are regulated and recorded, but local distribution of smaller quantities to retailers is not. This type of local cargo movement, the delivery of gasoline, diesel and jet fuel, could be tracked and estimated. These types of movements are primarily local flows, for example from the Kinder Morgan fuel depot in Las Vegas to local distributors, after arriving via the CALNEV pipeline. This study documents movement of commercial commodities in supply chains, and the movement on highways at the state and national level are probably reasonable estimations. There is no way to test and prove that assumption from these data.

What is clear from this study is that data and information at the County or local scale are deficient. Flow estimates and accident estimates for Clark County will need to be refined prior to conducting a risk analysis. The County may well be interested in the transportation of hazardous materials by local roads, as well as on highways; however, such an effort is well beyond the scope of this study.

Estimates of highway utilization, and the proportional use by trucks, will require additional attention. However, these measures are available from NDOT and will require coordination with ongoing efforts rather than primary data collection. Similarly, accident information is available but is not currently aggregated and available for the use we desire. Coordination with the Nevada State Police can potentially resolve this deficiency.

The transportation of nuclear waste to Yucca Mountain by truck, if it occurs, will not be on local roads. When, and if, the Yucca Mountain Repository accepts shipments by truck, those shipments will occur on designated highways. This report does provide the baseline estimates of the hazardous commodities that flow on those highways. This report provides a defendable estimate of those movements within the stated parameters that did not previously exist. For future examination of highway risk from the addition of nuclear waste, additional detail on local highway accident rates will be required. Additional detail on utilization on certain new highway segments will also be essential. Additional information on the local distribution of hazardous commodities may be desirable.

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APPENDIX A: STCC4 CATEGORY, HAZMAT CLASS AND /OR DIVISION, AND SELECTED HAZMAT COMMODITIES

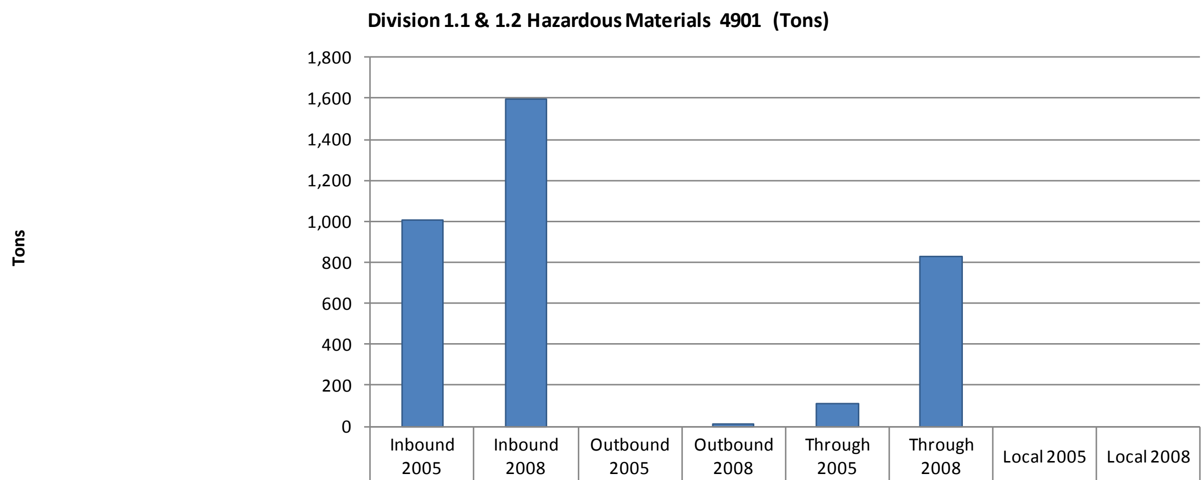
STCC4	HAZMAT Class/Division	Selected Hazardous Materials
4901	1.1, 1.2 Explosives	Cartridges, rockets, nitrocellulose, fuzes, bombs, mines, warheads
4902	1.3 Explosives	Rockets, incendiary ammunition, grenades, pyrotechnics
4903	1.4, 1.5 Explosives	Solid propellants, airbag inflators, inert cartridges, toy caps
4904	2.2 Nonflammable Gases	Oxygen-nitrogen mix, ammonia solution, refrigerant gas
4905	2.1 Flammable Gases	Liquified petroleum, propane, butane, acetylene, compressed gas
4906	3 Flammable Liquids	Aviation gas, pentene
4907	3 Flammable Liquids	Ethyl nitrate, nitrocellulose solution, ethanol, ether, vinyl acetate
4908	3 Flammable Liquids	Acetone, benzene, gasoline, octanes, petroleum distillates
4909	3 Flammable Liquids	Alcohols, pentanols, toluenes, butyl acetates, amyl nitrate
4910	3 Flammable Liquids	Paint, alcoholic beverages, adhesives, medicinal tinctures, tars
4912	3 Flammable Liquids	Naphtha, xylene, formaldehyde solutions, camphor oil
4913	3 Combustible Liquids	Pine oil, naphthalene, isopropyl alcohol, petroleum parrafins
4914	3 Combustible Liquids	Parrafin, aromatic hydrocarbons, coal tars, diesel fuel
4915	3 Combustible Liquids	Petroleum crude oil, kerosene, sulferized hydrocarbons
4916	4.2, 4.3 Spontaneously combustible	Barium alloys, titanium thrichloride, magnesium alkyls, cesium
4917	4.1 Flammable Solids	Safety matches, nitrocellulose films, sulfer, metal hydrides
4918	5.1 Oxidizers, 5.2 Organic Peroxides	Ammonium nitrate, sodium chlorite, organic peroxide
4919	5.2 Organic Peroxides	Organic peroxide
4920	2.3 Poisonous Gases	Arsine, phosphene, compressed fluorine, insecticide gases

STCC4	HAZMAT Class/Division	Selected Hazardous Materials
4921	6.1 Poisonous Commodities	Phosphorus trichloride, motor fuel anti-knock compounds
4923	6.1 Poisonous Commodities	Arsenic acid, sodium cyanide, beryllium compounds
4925	6.1 Packing Group III	Phenol solutions, triazine pesticides, alkaloids, solid mercury compounds
4927	6.1 Inhalation Hazard A	Nickel carbonyl, methyl vinyl ketone, hydrogen cyanide
4928	6.2 Etiologic Agents	Infectious substances, medical waste
4929	7 Radioactive Material	Uranium hexafluoride, fissile material
4930	8 Corrosive Material	Cupric chloride, hydrochloric acid, sulfuric acid, battery acid
4931	8 Corrosive Material	Nitric acid, acetic acid, copper chloride, liquid amines
4932	8 Corrosive Material	Antimony pentafluoride, sodium hydroxide, lactic acid, sodium silicate
4933	8 Corrosive Material	Butyl acid phosphate, amyl acid phosphate
4934	8 Corrosive Material	Ferric sulfates, phthalic anhydride, propyltrichlorosilane
4935	8 Corrosive Material	Caustic alkali liquids, sodium hydrosulfides, alkali battery fluids
4936	8 Corrosive Material	Fatty acid derived amines, manganese nitrate, non-explosive smoke bombs
4940	9 ORM-D	Carbon dioxide (dry-ice), hydrazine
4941	9 ORM-D	Creosote, self-inflating life-saving devices
4945	9 ORM-D	Ammonium nitrate based fertilizers, polychlorinated biphenyls, castor beans
4950	9 Mixed Loads of Hazardous Materials	Mixed load containing explosives, poison gas, radioactive, or military materials
4960	9 Mixed Loads of Hazardous Materials	Mixed load containing benzoic acid, carbon tetrachloride, lead, ethylene glycol
4961	9 Mixed Loads of Hazardous Materials	Mixed load containing cupric sulfate, formaldehyde, plastic molding compounds
4962	9.1 Environmentally Hazardous Commodities	Zinc dithiophosphate, dimethyl phthalate, asbestos
4963	9.1 Environmentally Hazardous Commodities	Lead sulfide, chromic acetate, sodium bichromate, fertilizing compounds
4966	9 Environmentally Hazardous Commodities	Ammonium bezoate, polycyclic organic matter, arsenic compounds

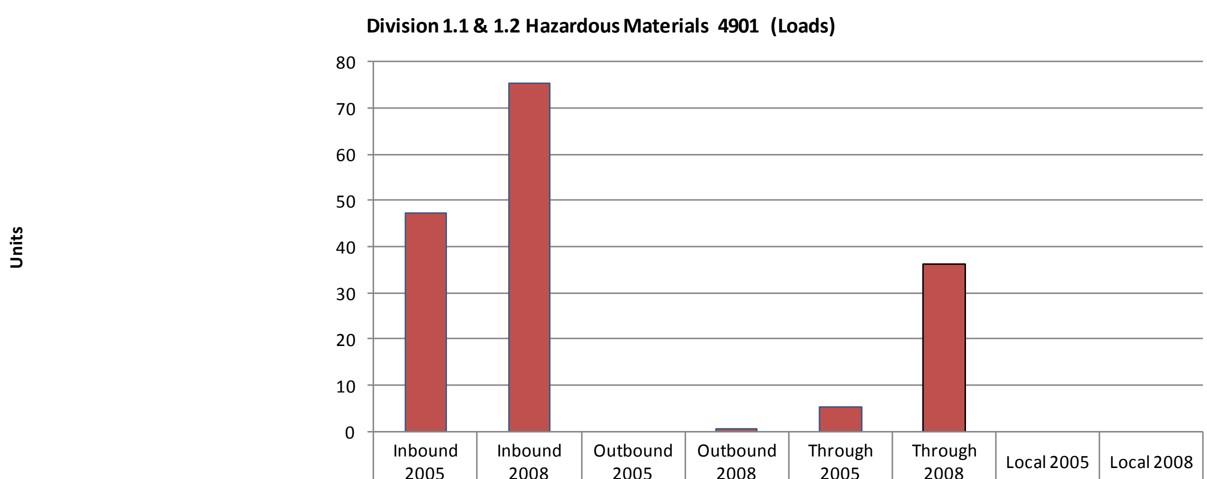
APPENDIX B: DETAILED HAZMAT FLOW BY STCC4

Hazardous Commodity Description & STCC4 Code	2005 Tons	2008 Tons	2005 Loads	2008 Loads
Division 1.1 & 1.2 Hazardous Materials 4901	1,119	2,428	53	112
Division 1.3 Explosives 4902	11,482	6,733	818	459
Division 1.4 & 1.5 Explosives 4903	840	415	41	20
Division 2.2 Nonflammable Gases & Gas Mixtures 4904	174,320	96,259	8,980	5,060
Division 2.1 Flammable Gases 4905	870,685	689,954	37,972	32,487
Class 3 Flammable Liquids 4906	47,615	28,271	2,379	1,395
Class 3 Flammable Liquids 4907	236,744	131,571	11,703	6,468
Class 3 Flammable Liquids 4908	210,505	75,228	9,385	3,491
Class 3 Flammable Liquids 4909	521,616	275,582	25,597	13,511
Class 3 Flammable Liquids 4910	97,220	42,207	4,285	1,869
Class 3 Flammable Liquids 4912	183,487	140,408	8,231	6,453
Combustible Liquids 4913	24,260	11,441	1,171	558
Combustible Liquids 4914	183,191	38,824	7,730	1,665
Combustible Liquids 4915	32,388	7,402	1,484	345
Division 4.2 Spont. Combustible & 4.3 Dangerous when Wet 4916	234,799	204,015	9,403	8,072
Division 4.1 Flammable Solids 4917	218,012	202,503	8,691	8,009
Division 5.1 Oxidizers 4918	218,217	86,155	10,750	4,266
Division 5.2 Organic Peroxides 4919	72	2	4	0
Division 2.3 Poisonous or Corrosive Gases 4920	260,640	31,253	12,809	1,559
Division 6.1 Poisonous Material, Other Commodities 4921	85,927	40,384	4,125	1,932
Division 6.1 Poisonous Material, Other Commodities 4923	7,352	579	353	27
Division 6.1 Poisonous Material, Packing Group III 4925	50,445	18,423	2,479	909
Division 6.1 Poisonous Material, Hazard Zone A 4927	735	53	36	3
Division 6.2 Etiologic Agents, Infectious Substances 4928	14,449	11,545	651	525
Class 7 Radioactive Materials 4929	13,831	12,145	744	682
Class 8 Corrosive Materials 4930	343,055	112,974	16,996	5,633
Class 8 Corrosive Materials 4931	96,525	49,206	4,801	2,425
Class 8 Corrosive Materials 4932	36,802	8,739	1,801	432
Class 8 Corrosive Materials 4933	39	0	2	0
Class 8 Corrosive Materials 4934	148	5	7	0
Class 8 Corrosive Materials 4935	580,562	35,044	28,373	1,709
Class 8 Corrosive Materials 4936	79,475	21,408	4,380	2,095
ORM-D 4940	204	80	10	4
ORM-D 4941	79,038	5,989	3,729	281
ORM-D 4945	62,743	4,350	3,290	222
Freight All Kinds, Hazardous Materials 4950	16,236	5,484	779	257
Division 9.1 Environmentally Hazardous Commodities 4960	159,895	44,859	7,601	2,173
Division 9.1 Environmentally Hazardous Commodities 4961	619,872	108,895	25,980	4,520
Division 9.2 Environmentally Hazardous Commodities 4962	69,778	60,248	3,319	2,622
Division 9.2 Environmentally Hazardous Commodities 4963	20,339	1,302	959	62
Class 9 Environmentally Hazardous, Other Commodities 4966	59,685	49,729	2,935	2,233
Total	**5,924,348**	**2,662,094**	**274,836**	**124,546**

APPENDIX C: DETAILED HAZMAT FLOW BY STCC4 CATEGORY: LOADS, TONS, AND ROUTING

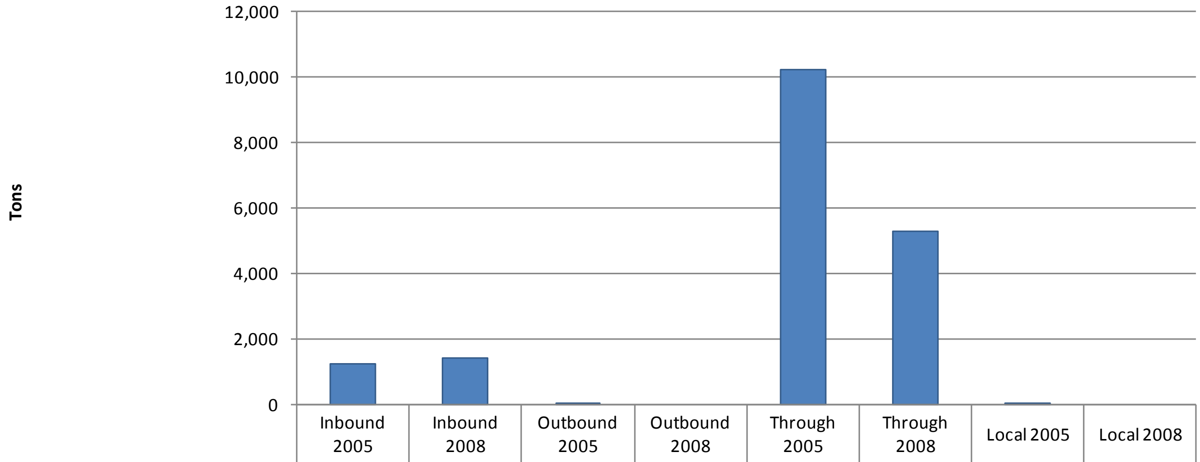


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 1.1 & 1.2 Hazardous Materials 4901 (Tons)	1,007	1,593	0	8	112	827	0	0



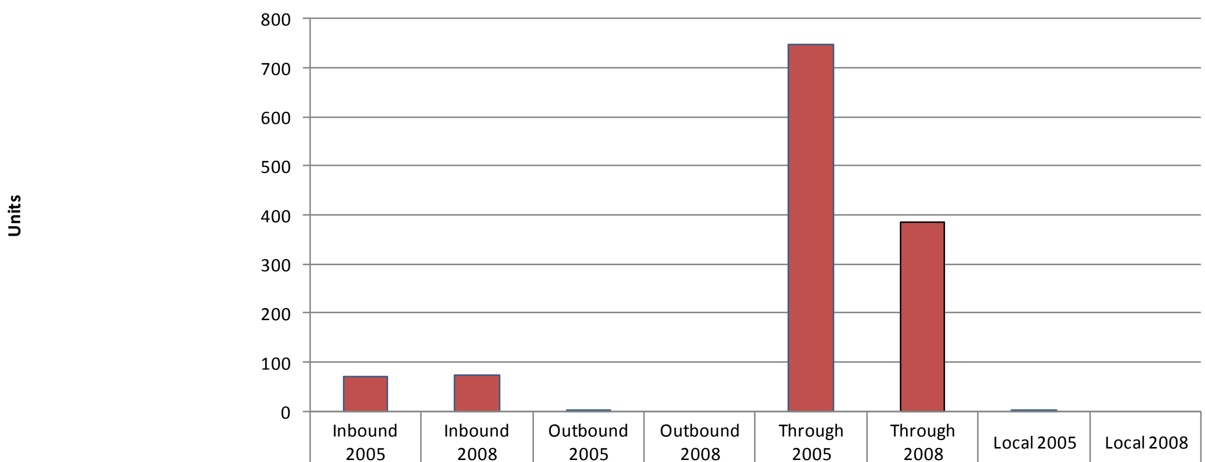
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 1.1 & 1.2 Hazardous Materials 4901 (Loads)	47	75	0	0	5	36	0	0

Division 1.3 Explosives 4902 (Tons)



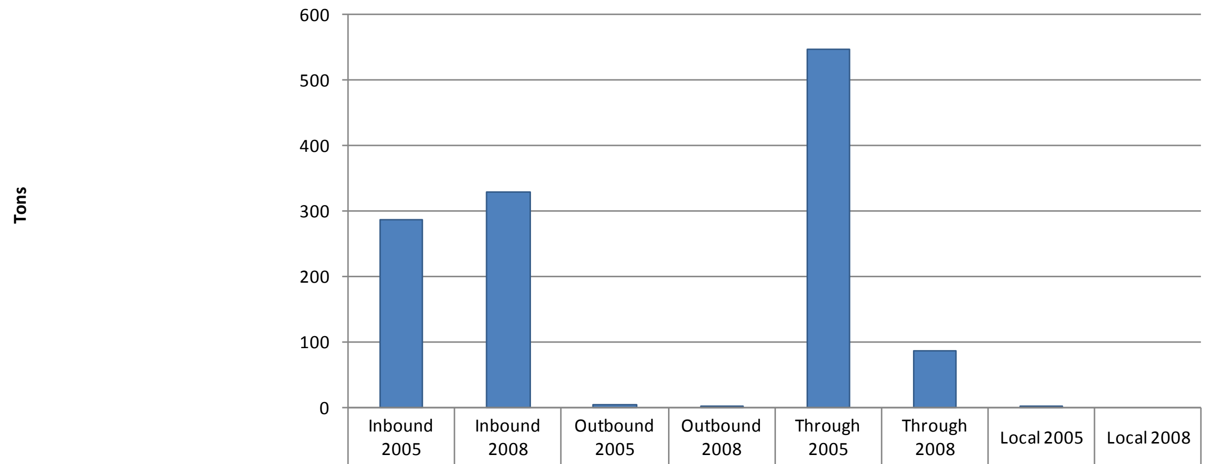
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 1.3 Explosives 4902 (Tons)	1,256	1,431	1	0	10,224	5,302	0	0

Division 1.3 Explosives 4902 (Loads)



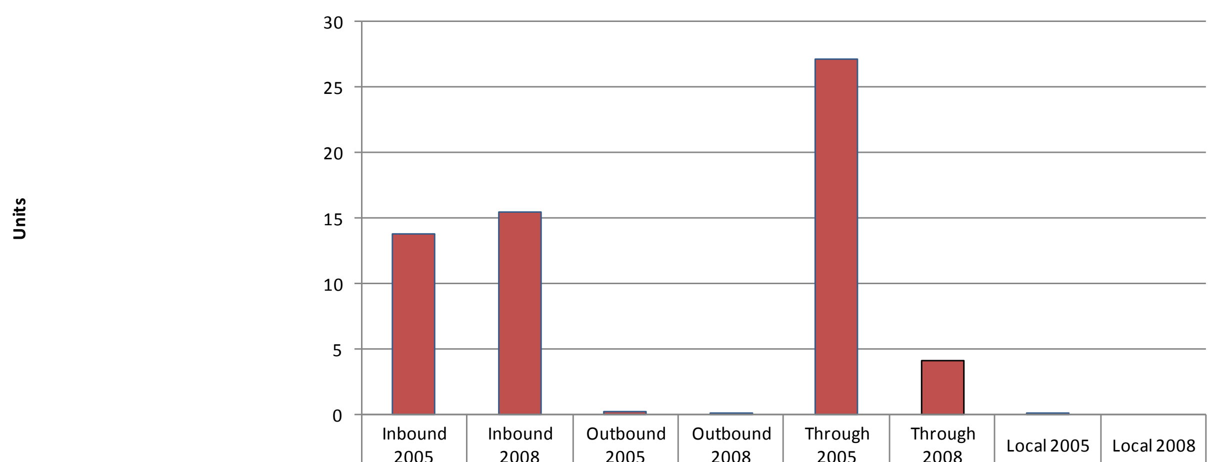
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 1.3 Explosives 4902 (Loads)	71	73	0	0	747	386	0	0

Division 1.4 & 1.5 Explosives 4903 (Tons)

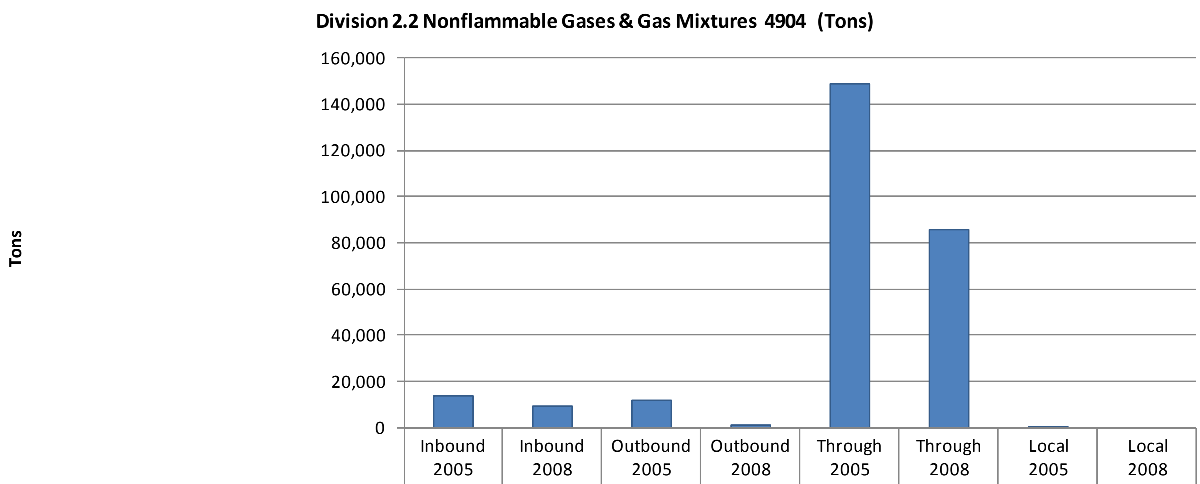


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 1.4 & 1.5 Explosives 4903 (Tons)	288	329	4	1	547	86	1	0

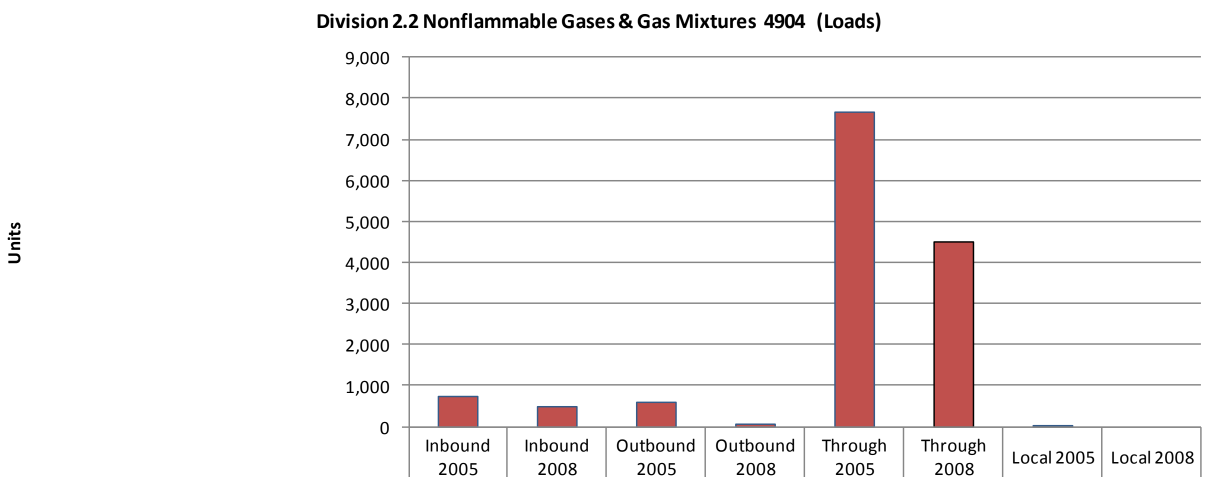
Division 1.4 & 1.5 Explosives 4903 (Loads)



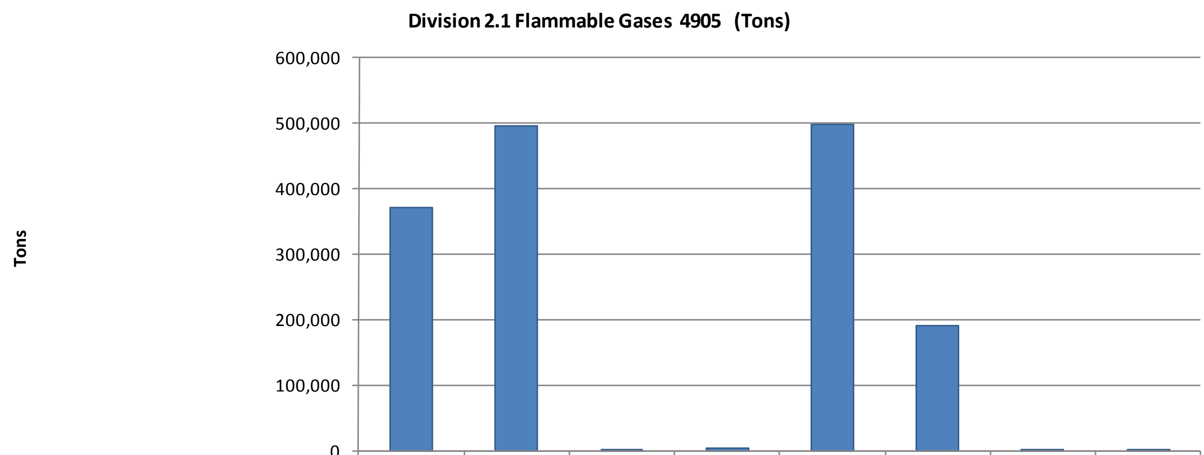
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 1.4 & 1.5 Explosives 4903 (Loads)	14	15	0	0	27	4	0	0



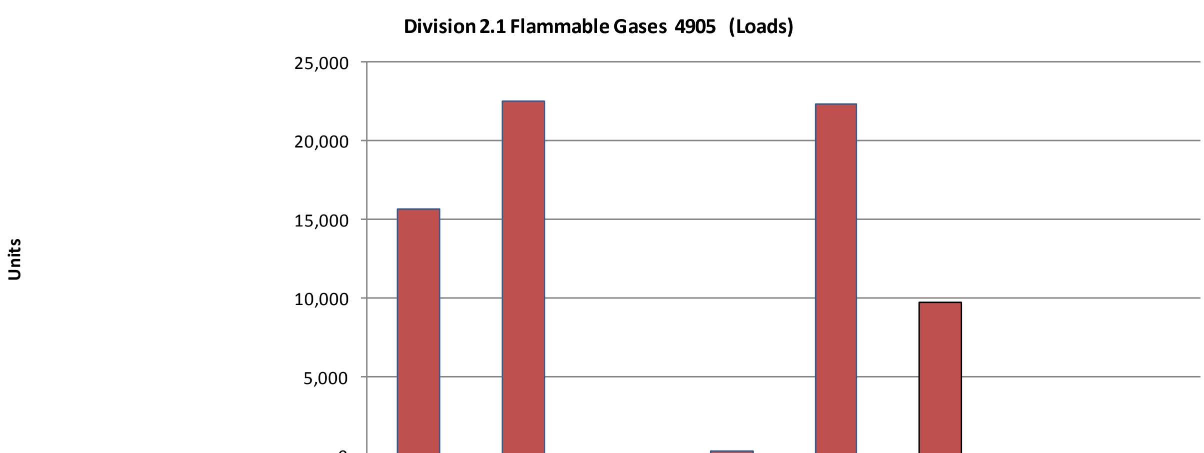
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 2.2 Nonflammable Gases & Gas Mixtures 4904 (Tons)	13,472	9,161	11,890	1,317	148,779	85,781	179	0



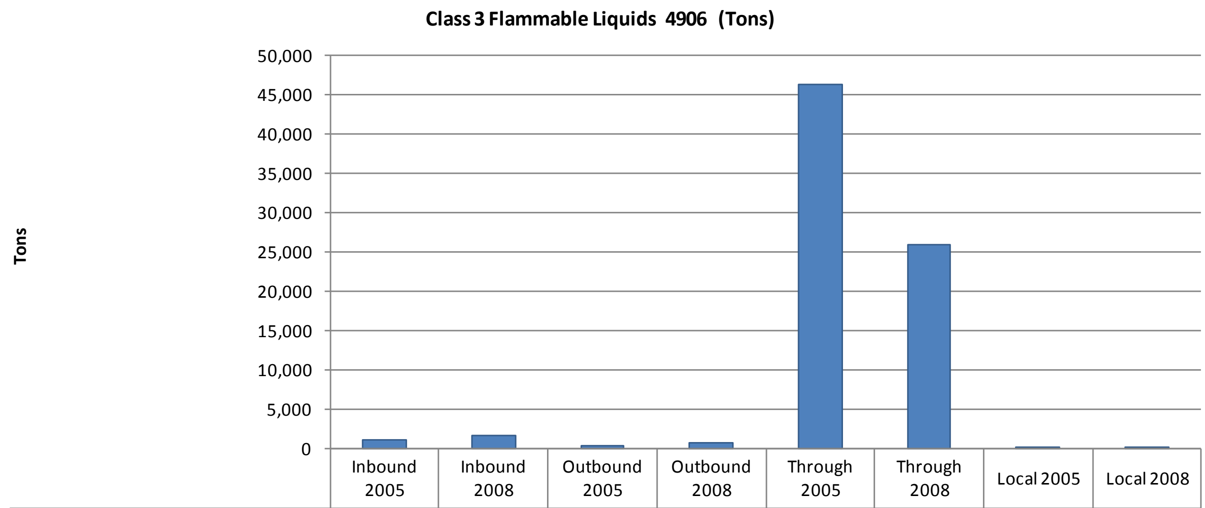
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 2.2 Nonflammable Gases & Gas Mixtures 4904 (Loads)	717	493	589	66	7,666	4,501	9	0



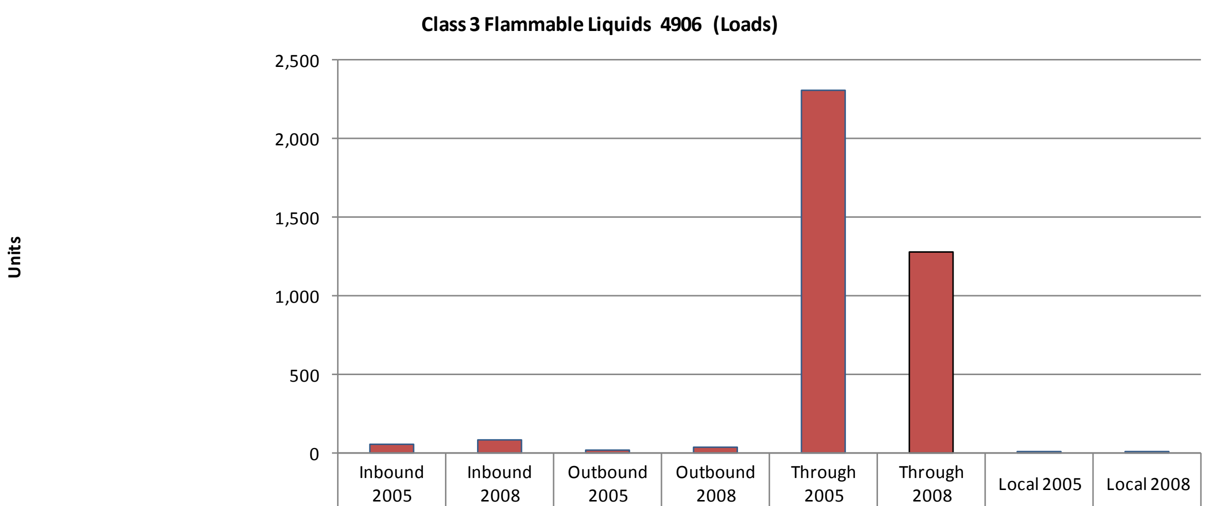
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 2.1 Flammable Gases 4905 (Tons)	371,643	495,311	181	3,165	498,861	191,475	1	2



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 2.1 Flammable Gases 4905 (Loads)	15,659	22,507	11	227	22,301	9,752	0	0

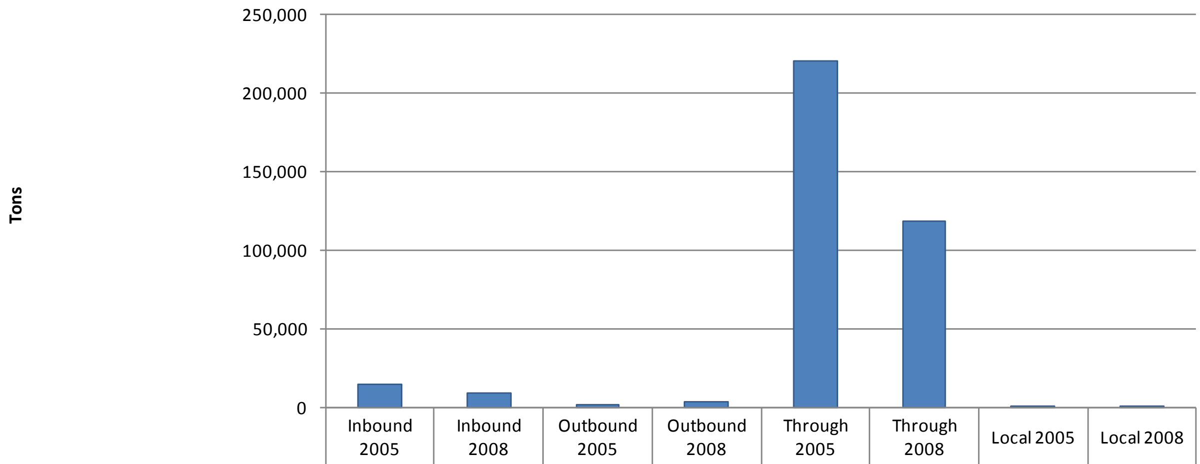


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4906 (Tons)	1,058	1,634	307	764	46,248	25,866	1	7



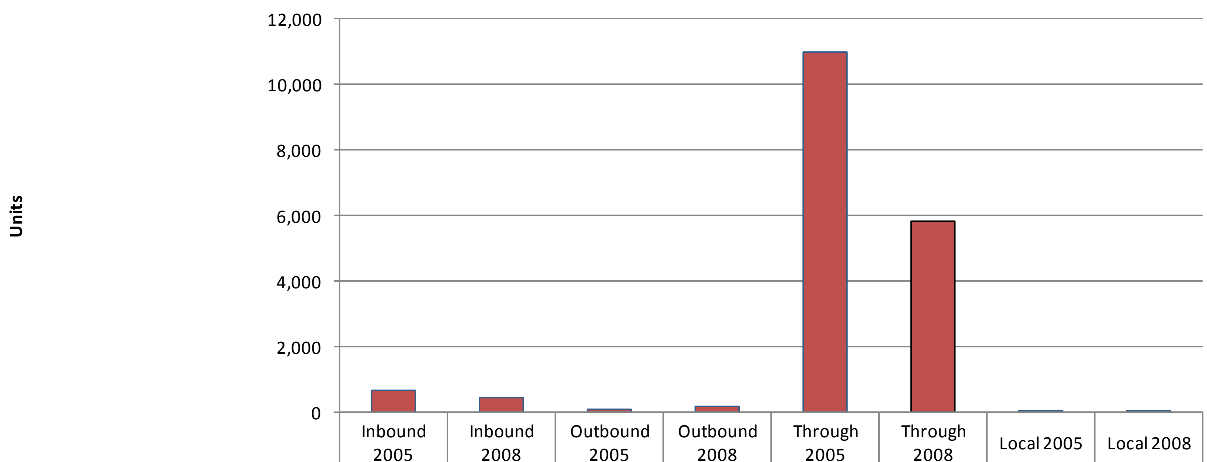
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4906 (Loads)	53	82	15	38	2,310	1,275	0	0

Class 3 Flammable Liquids 4907 (Tons)



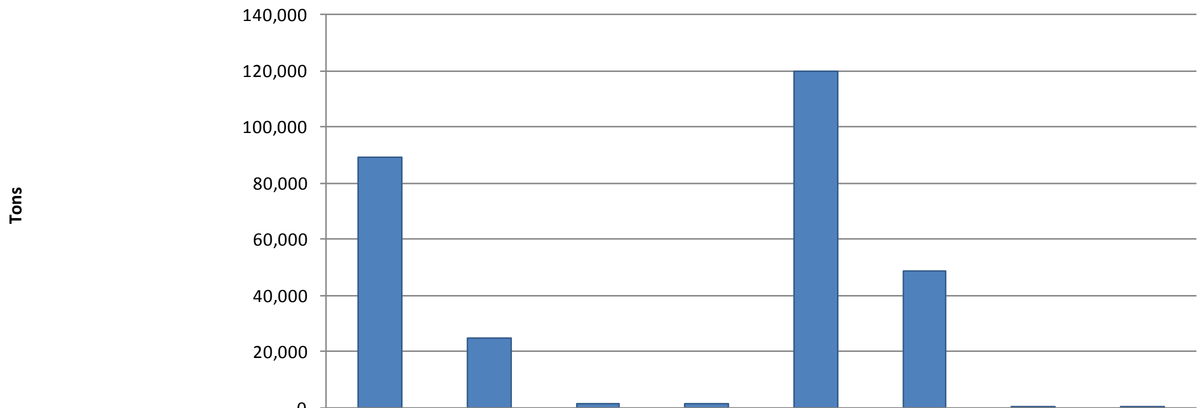
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4907 (Tons)	14,645	9,219	1,610	3,566	220,433	118,744	55	43

Class 3 Flammable Liquids 4907 (Loads)



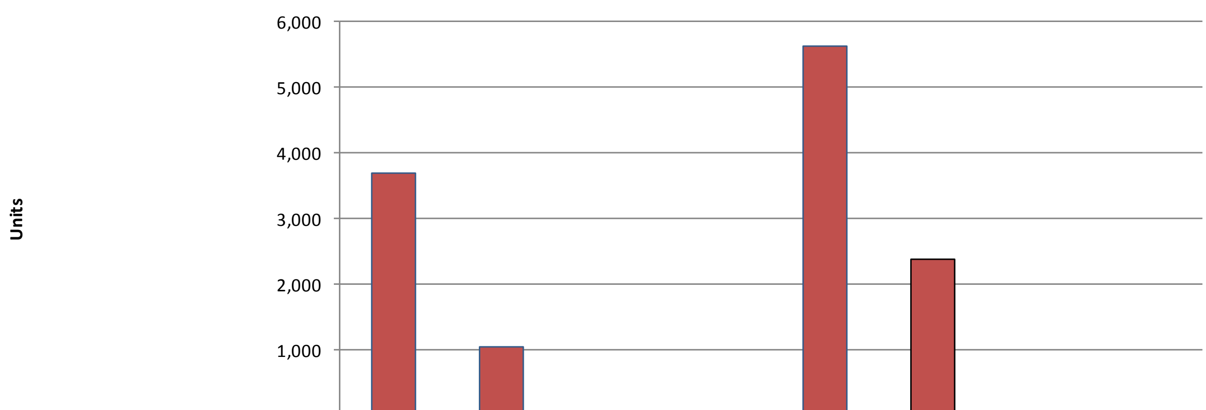
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4907 (Loads)	651	442	80	178	10,969	5,846	3	2

Class 3 Flammable Liquids 4908 (Tons)

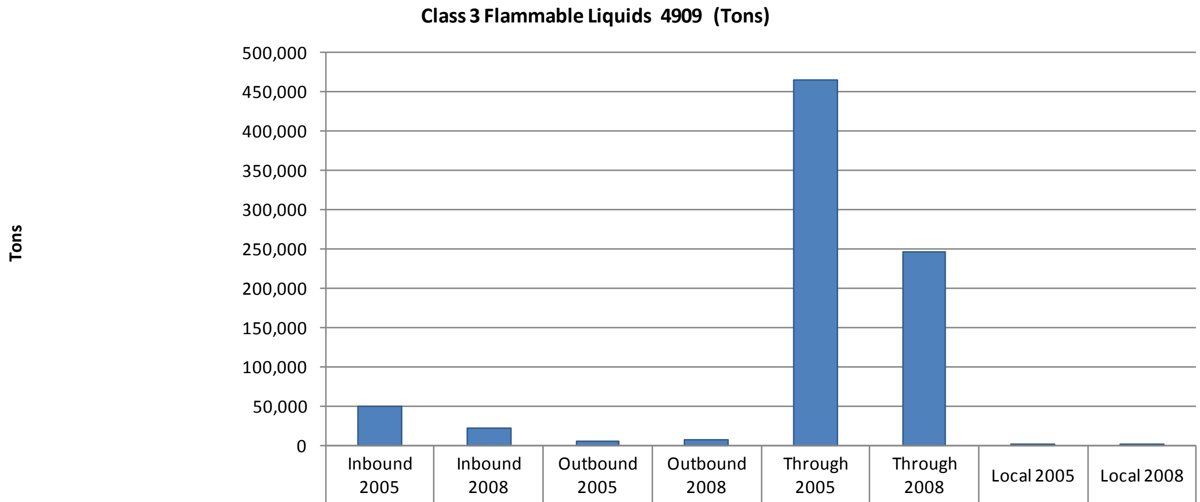


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4908 (Tons)	89,070	24,726	1,356	1,457	119,874	48,991	205	54

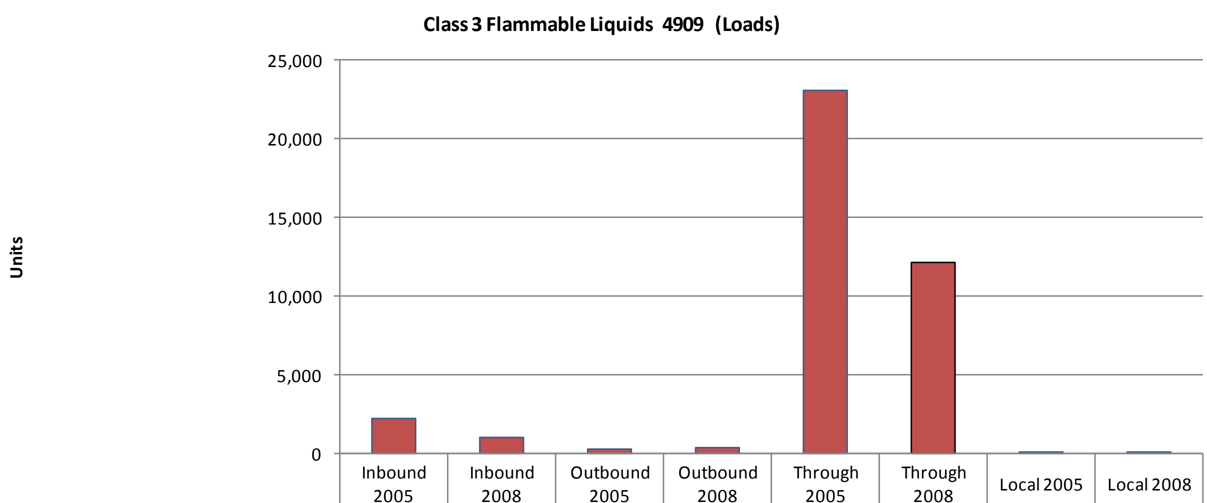
Class 3 Flammable Liquids 4908 (Loads)



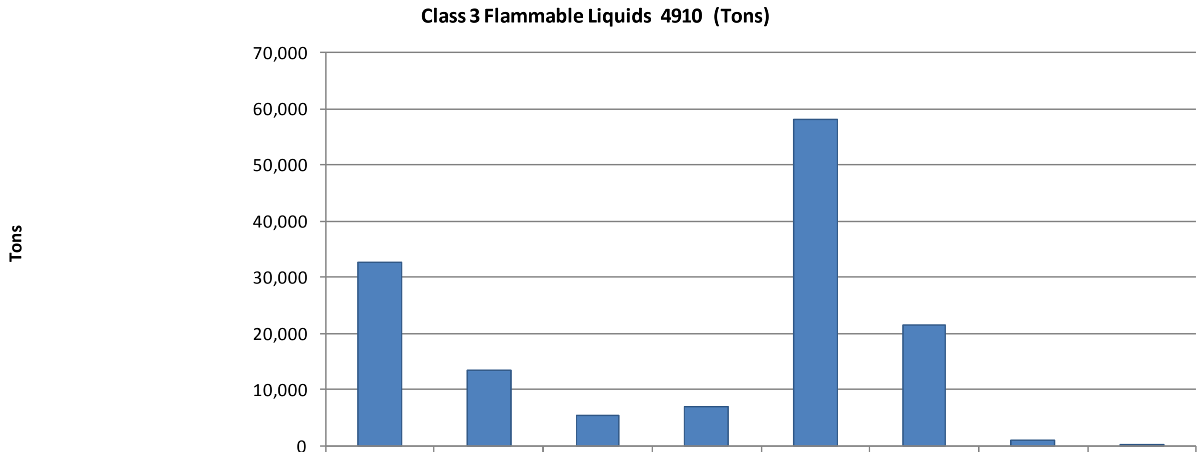
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4908 (Loads)	3,682	1,033	66	73	5,626	2,382	10	3



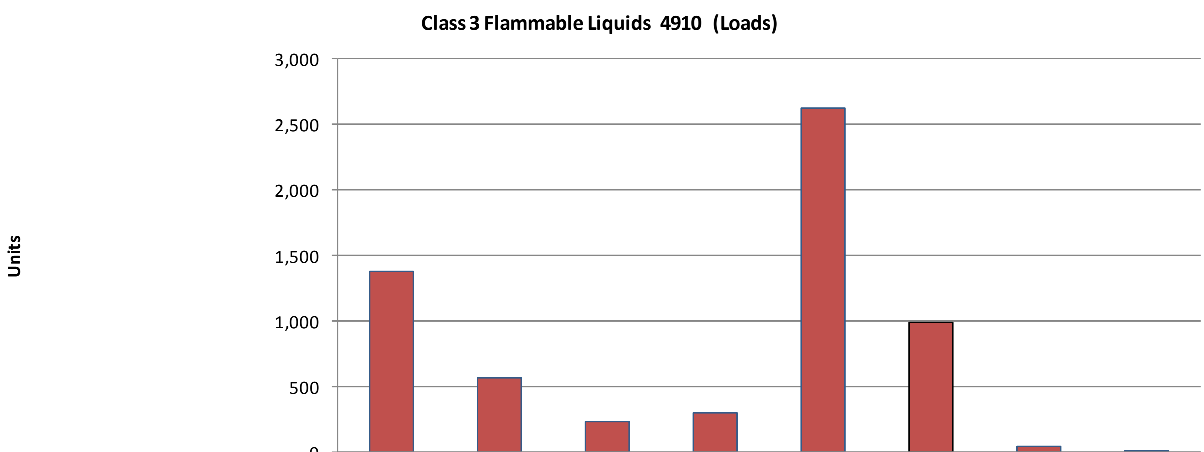
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4909 (Tons)	49,719	21,799	5,471	7,425	465,646	246,261	781	96



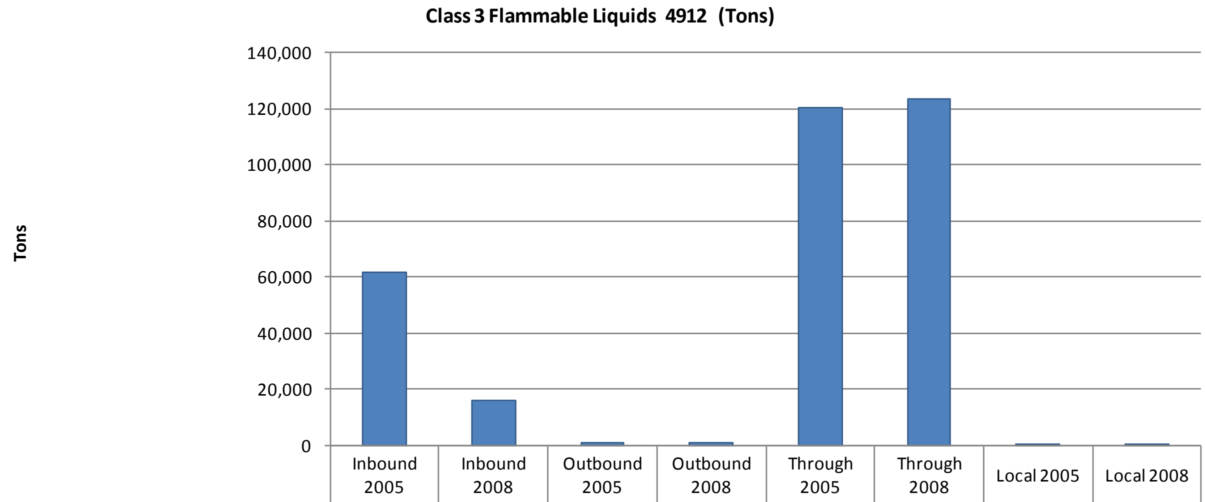
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4909 (Loads)	2,174	1,017	271	371	23,113	12,118	38	5



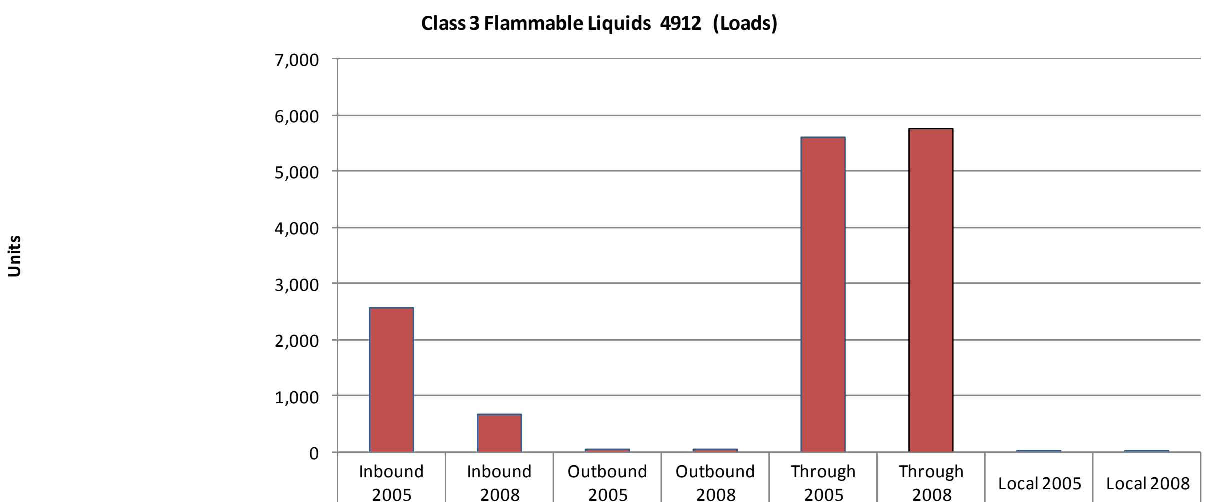
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4910 (Tons)	32,665	13,535	5,414	7,016	58,203	21,518	938	137



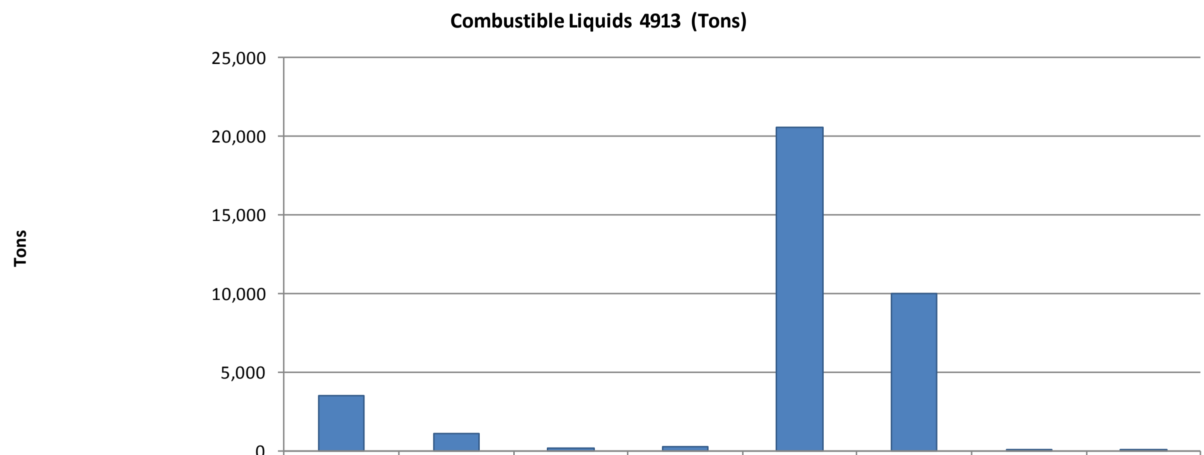
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4910 (Loads)	1,378	568	237	304	2,630	991	41	6



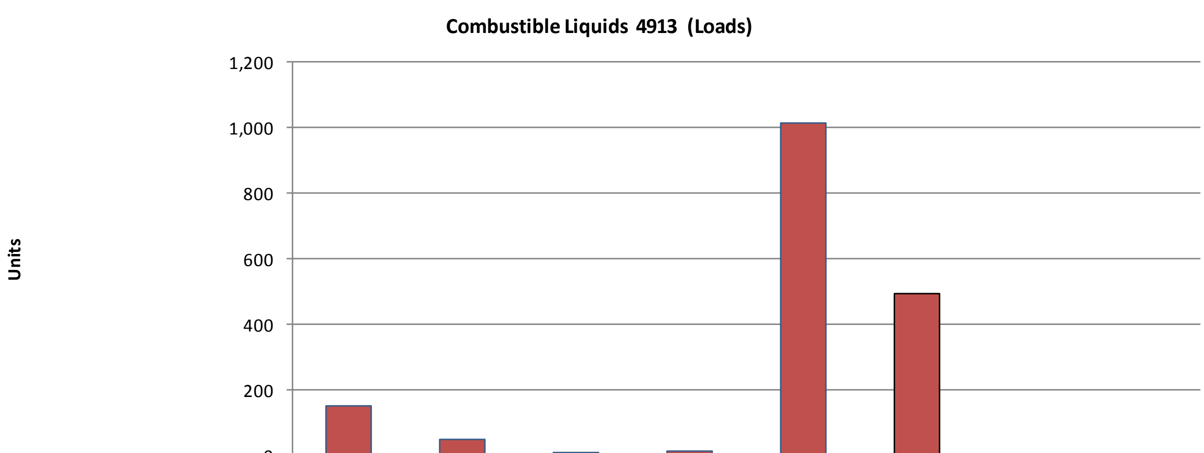
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4912 (Tons)	61,663	15,948	1,041	752	120,591	123,684	192	25



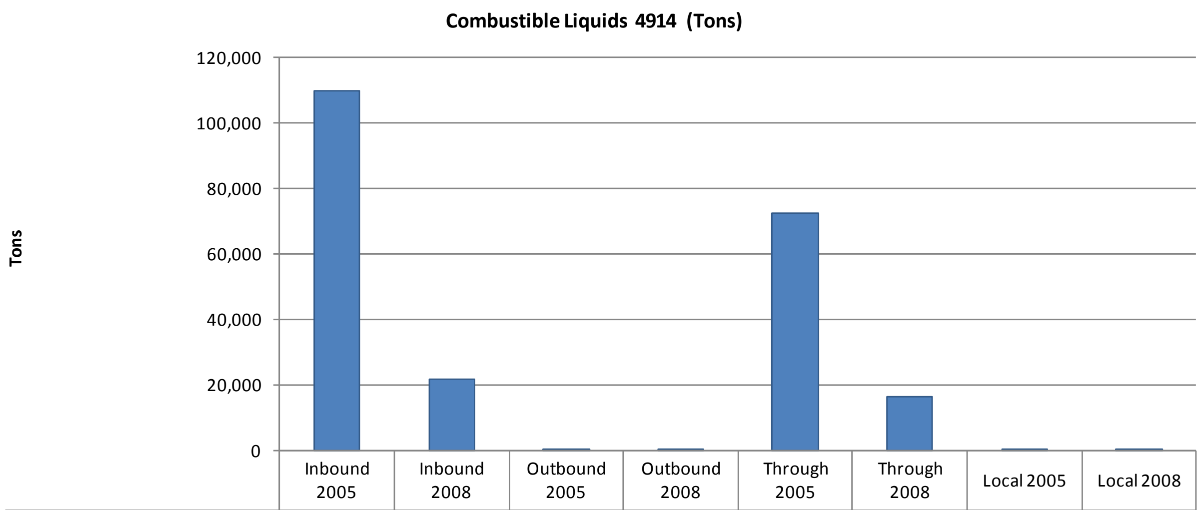
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 3 Flammable Liquids 4912 (Loads)	2,567	660	51	38	5,603	5,755	10	1



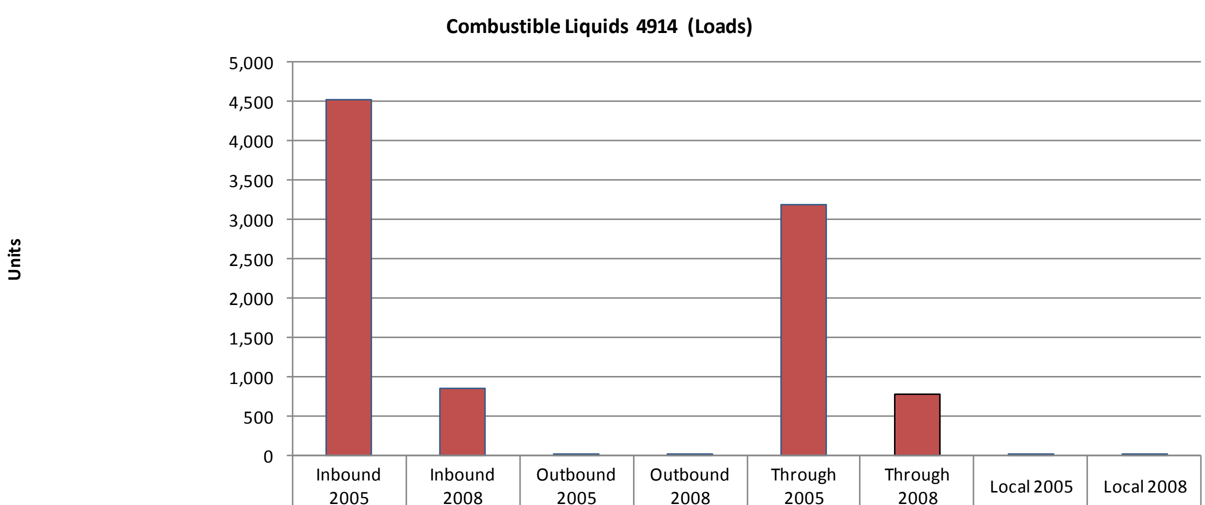
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Combustible Liquids 4913 (Tons)	3,541	1,131	135	272	20,576	10,035	8	3



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Combustible Liquids 4913 (Loads)	151	51	7	14	1,013	494	0	0

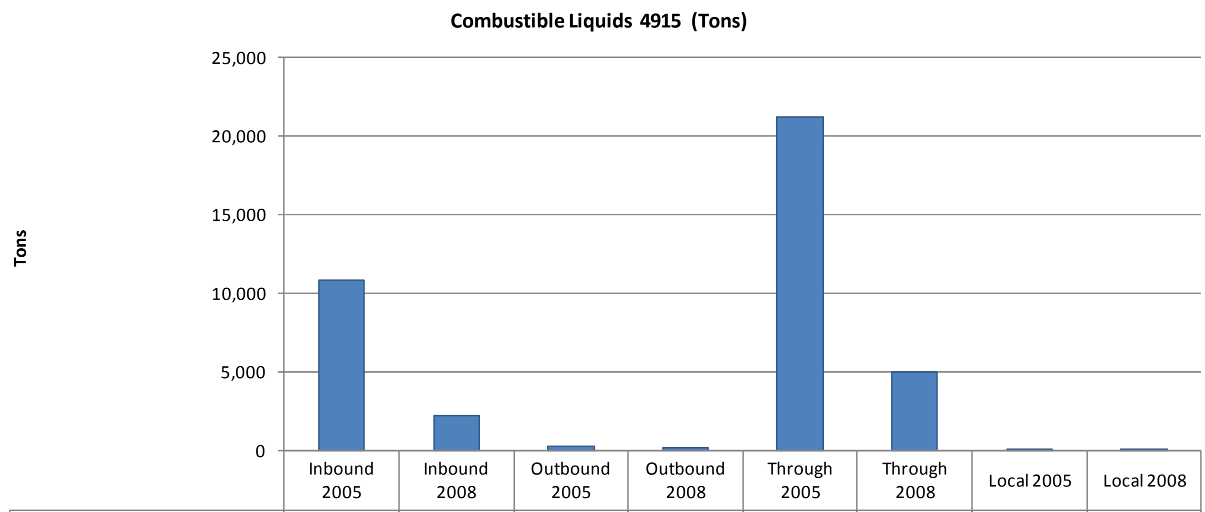


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Combustible Liquids 4914 (Tons)	109,989	21,769	506	490	72,631	16,520	65	46



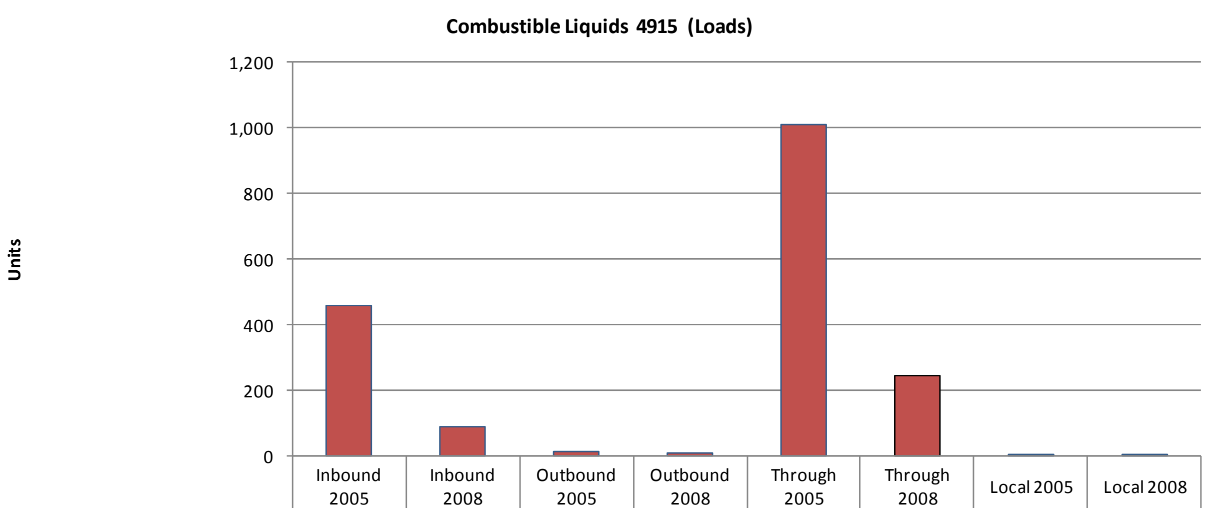
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Combustible Liquids 4914 (Loads)	4,520	857	25	25	3,183	781	3	2

Combustible Liquids 4915 (Tons)



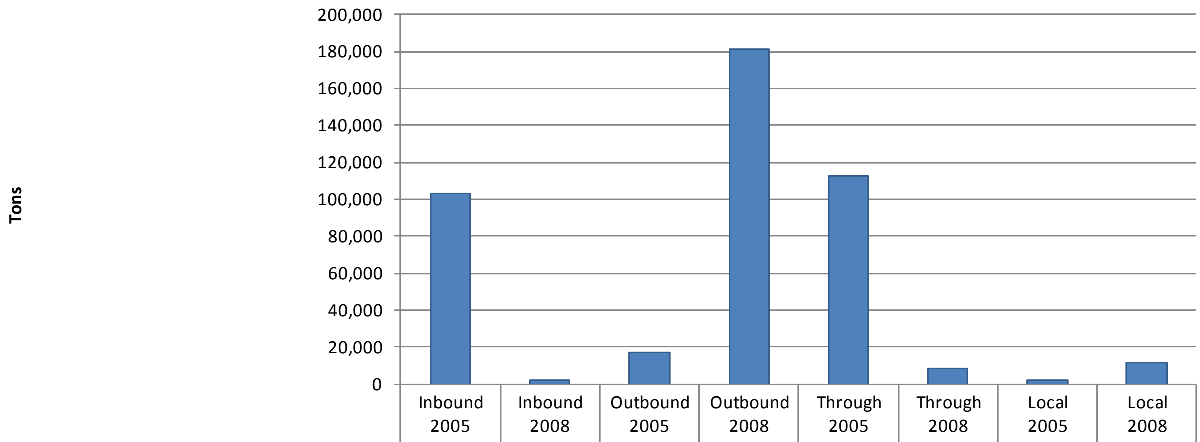
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Combustible Liquids 4915 (Tons)	10,813	2,169	276	177	21,249	5,035	50	21

Combustible Liquids 4915 (Loads)



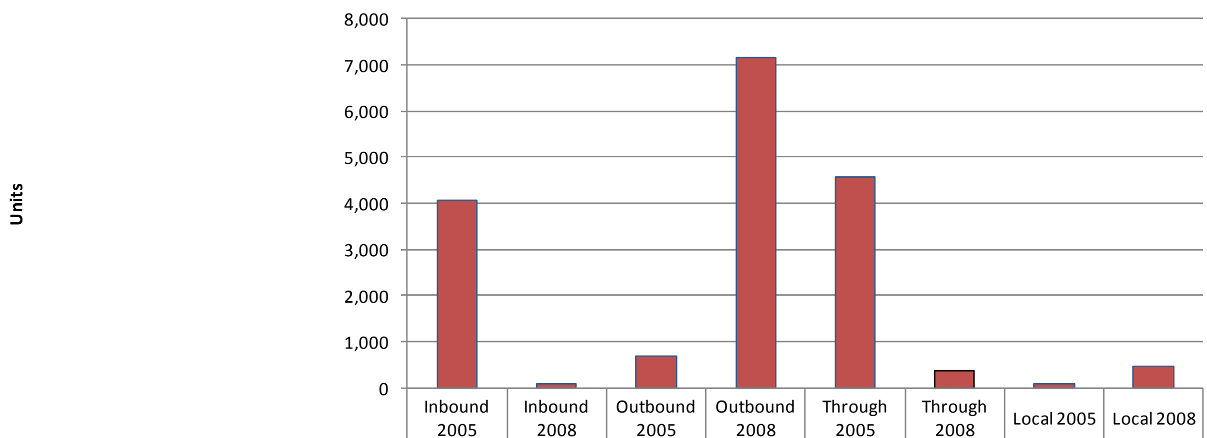
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Combustible Liquids 4915 (Loads)	457	89	13	9	1,010	246	2	1

Division 4.2 Spont. Combustible & 4.3 Dangerous when Wet 4916 (Tons)



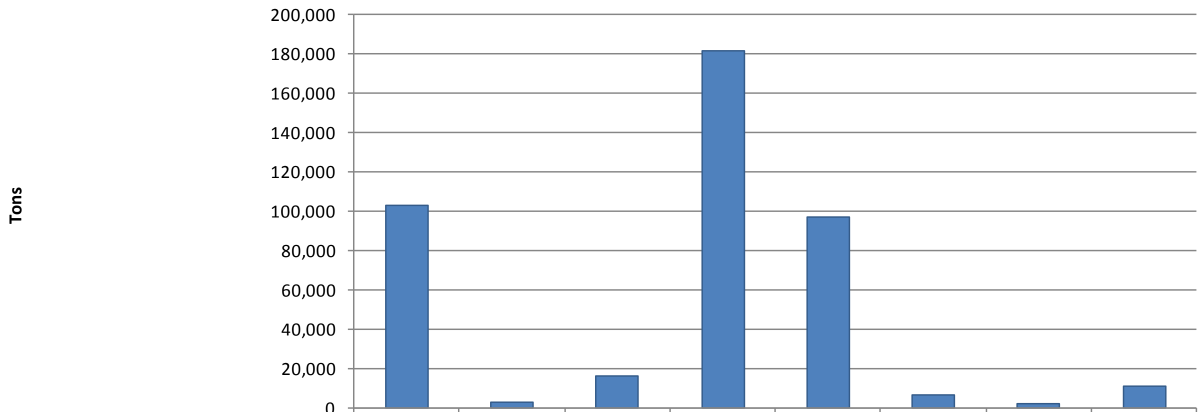
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 4.2 Spont. Combustible & 4.3 Dangerous when Wet 4916 (Tons)	102,863	2,390	17,286	181,550	112,733	8,752	1,918	11,322

Division 4.2 Spont. Combustible & 4.3 Dangerous when Wet 4916 (Loads)



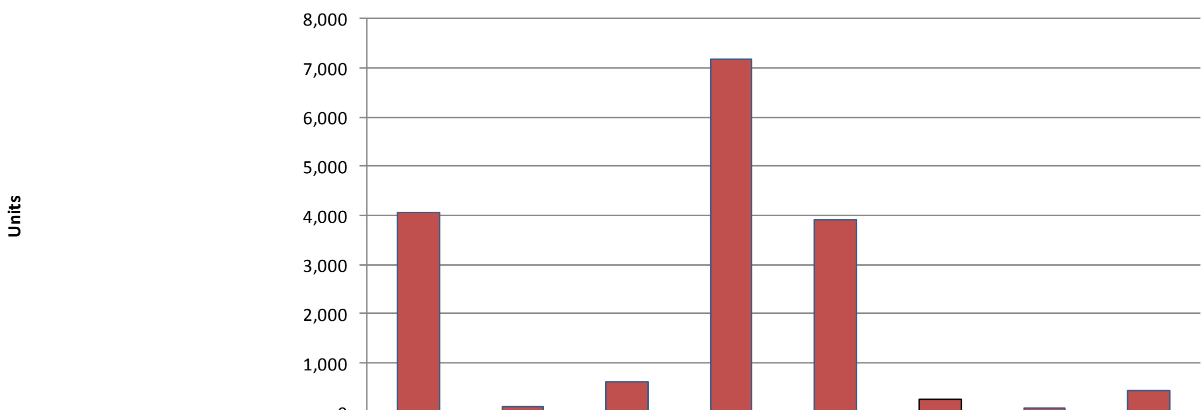
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 4.2 Spont. Combustible & 4.3 Dangerous when Wet 4916 (Loads)	4,066	95	696	7,167	4,565	363	76	447

Division 4.1 Flammable Solids 4917 (Tons)

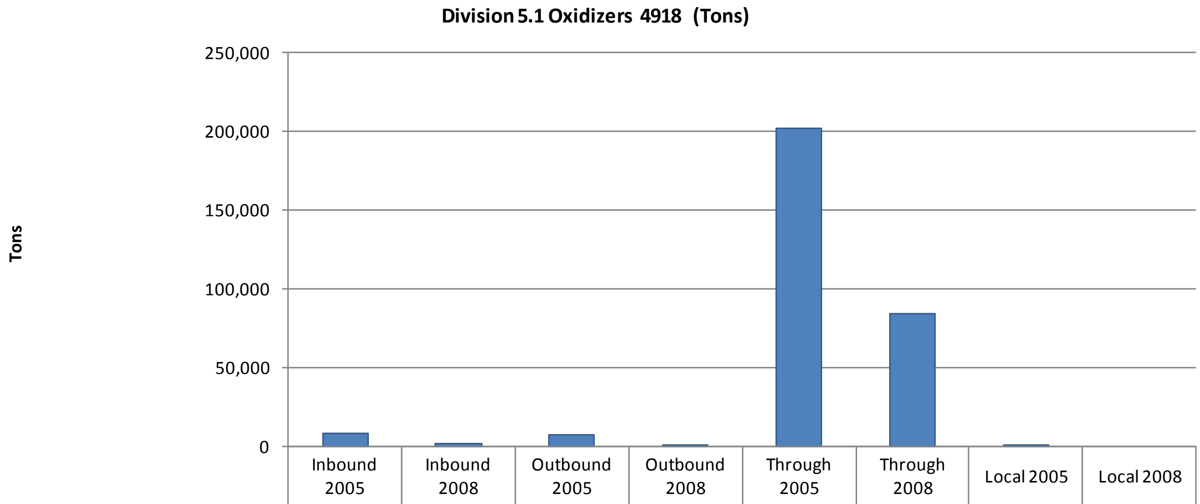


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 4.1 Flammable Solids 4917 (Tons)	102,663	2,992	15,997	181,741	97,418	6,460	1,935	11,311

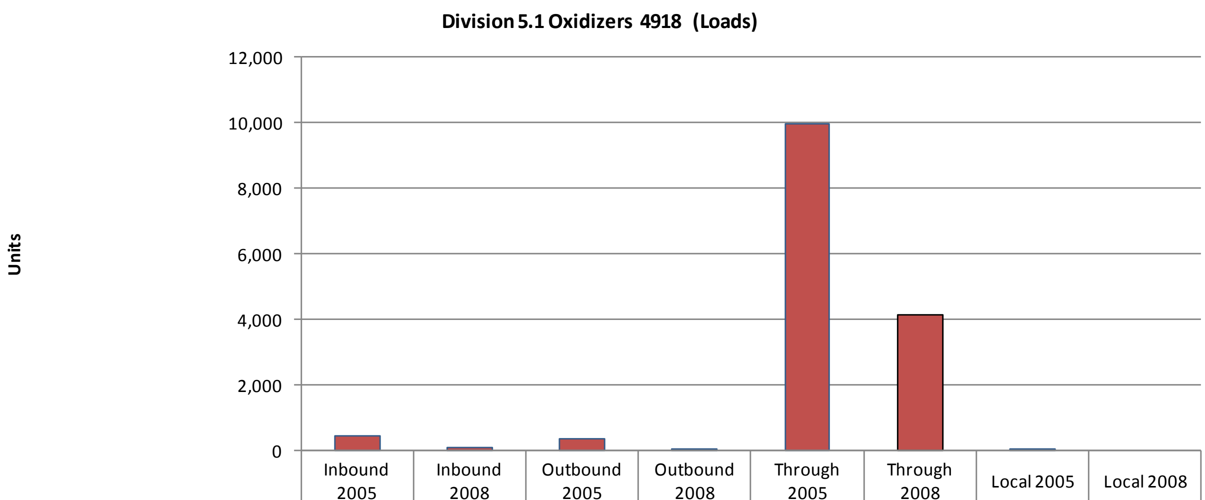
Division 4.1 Flammable Solids 4917 (Loads)



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 4.1 Flammable Solids 4917 (Loads)	4,066	124	633	7,176	3,915	263	77	446

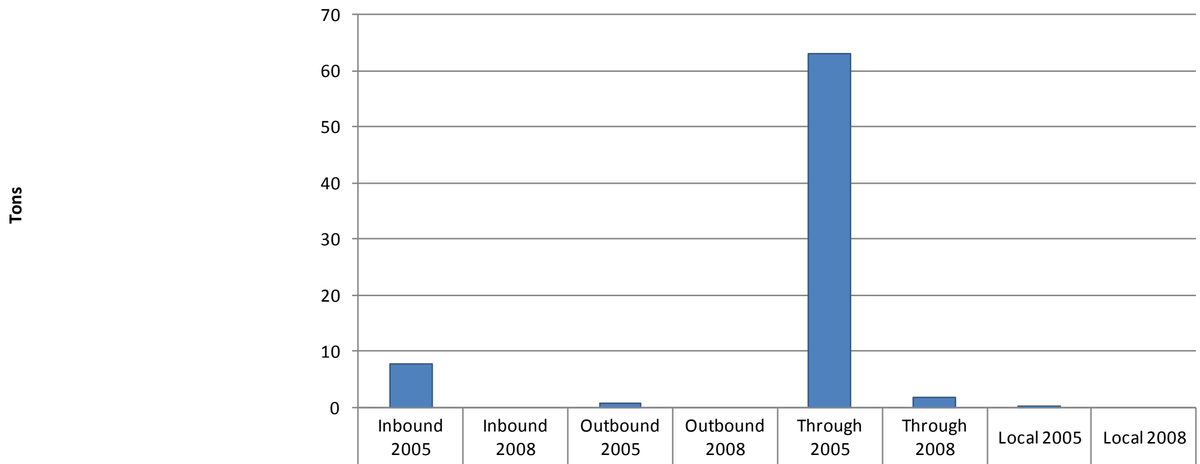


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 5.1 Oxidizers 4918 (Tons)	8,671	1,689	7,279	620	202,118	83,846	148	0



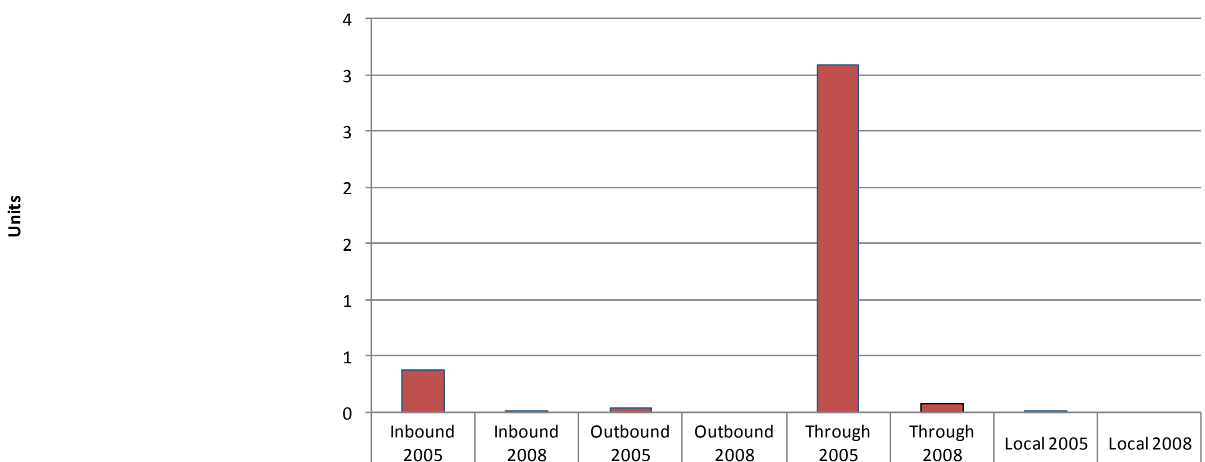
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 5.1 Oxidizers 4918 (Loads)	422	84	359	31	9,962	4,151	7	0

Division 5.2 Organic Peroxides 4919 (Tons)

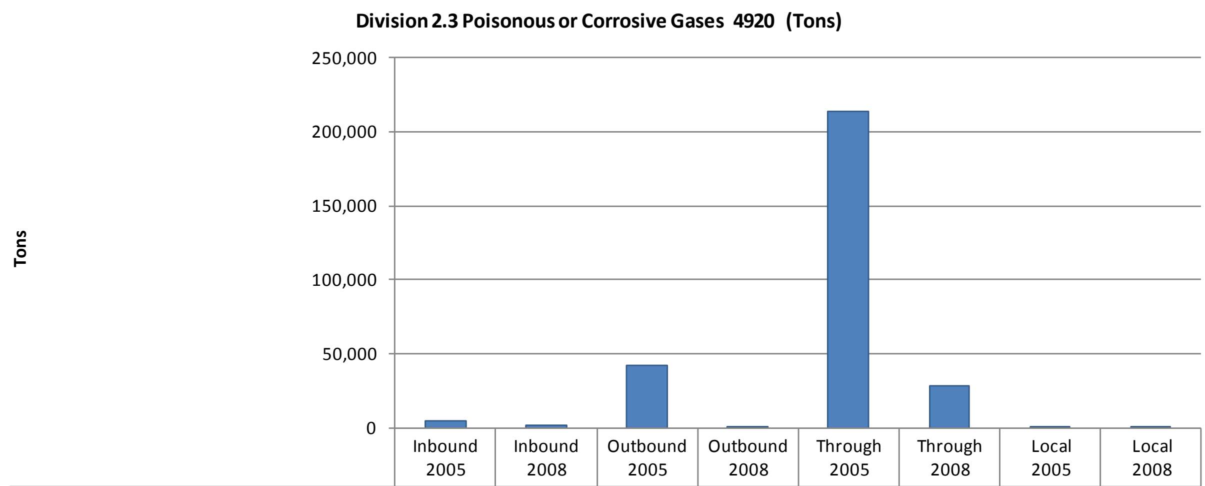


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 5.2 Organic Peroxides 4919 (Tons)	8	0	1	0	63	2	0	0

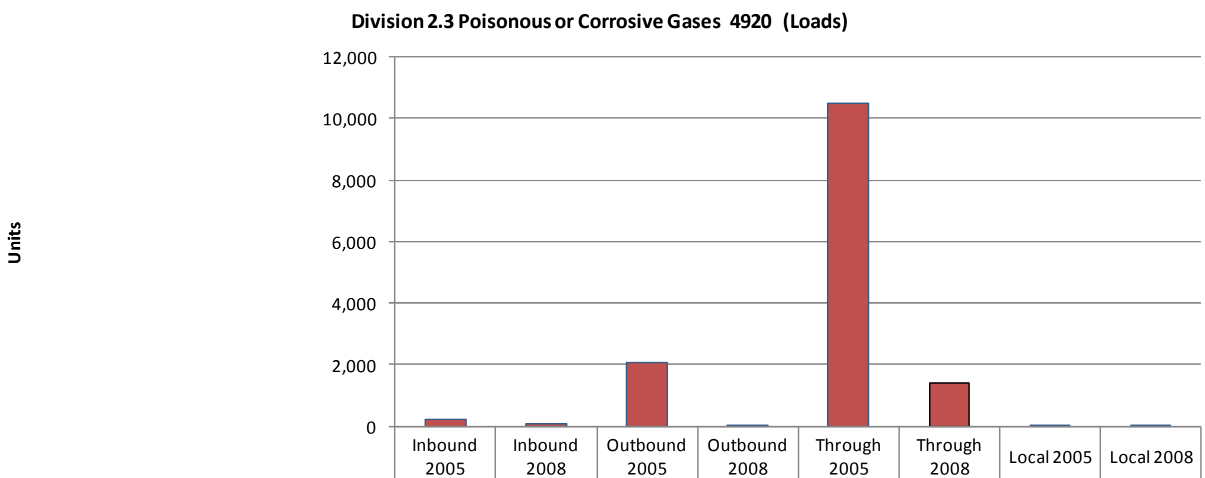
Division 5.2 Organic Peroxides 4919 (Loads)



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 5.2 Organic Peroxides 4919 (Loads)	0	0	0	0	3	0	0	0

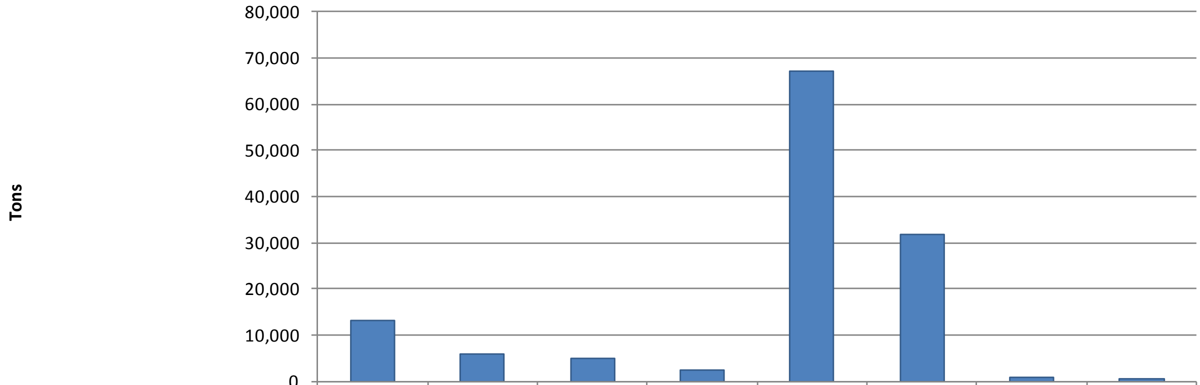


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 2.3 Poisonous or Corrosive Gases 4920 (Tons)	4,833	1,955	42,276	761	213,368	28,532	164	6



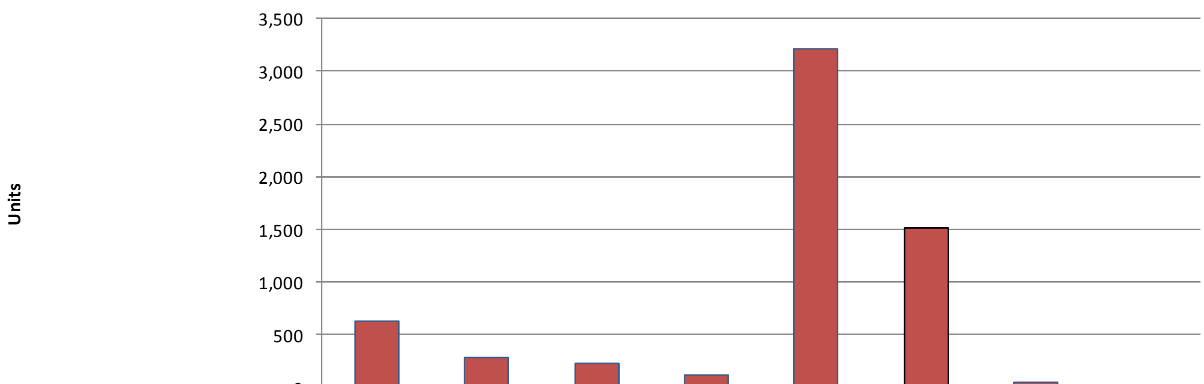
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 2.3 Poisonous or Corrosive Gases 4920 (Loads)	240	100	2,067	38	10,494	1,421	8	0

Division 6.1 Poisonous Material, Other Commodities 4921 (Tons)



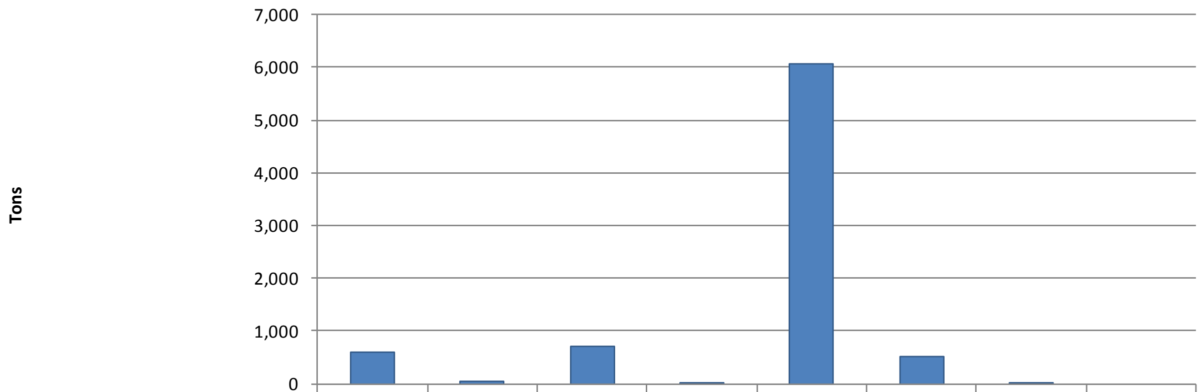
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 6.1 Poisonous Material, Other Commodities 4921 (Tons)	13,034	5,924	4,784	2,393	67,194	31,671	915	397

Division 6.1 Poisonous Material, Other Commodities 4921 (Loads)



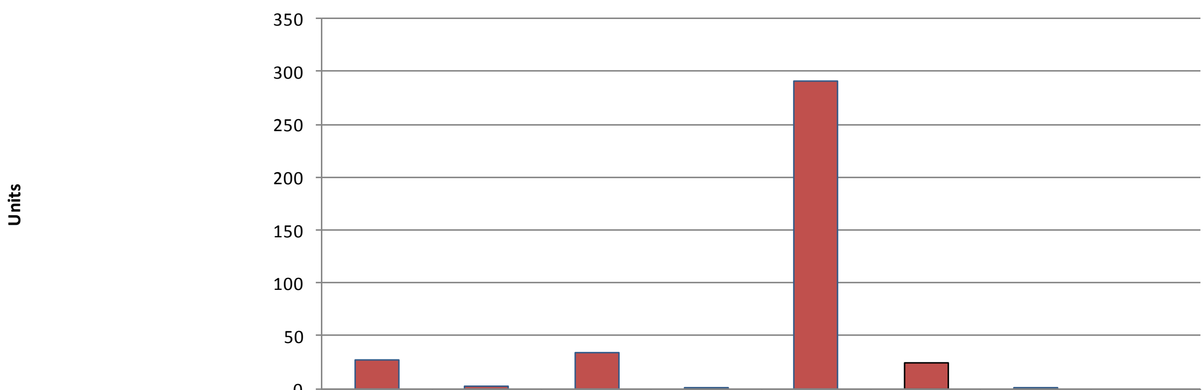
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 6.1 Poisonous Material, Other Commodities 4921 (Loads)	628	285	233	115	3,219	1,513	45	19

Division 6.1 Poisonous Material, Other Commodities 4923 (Tons)

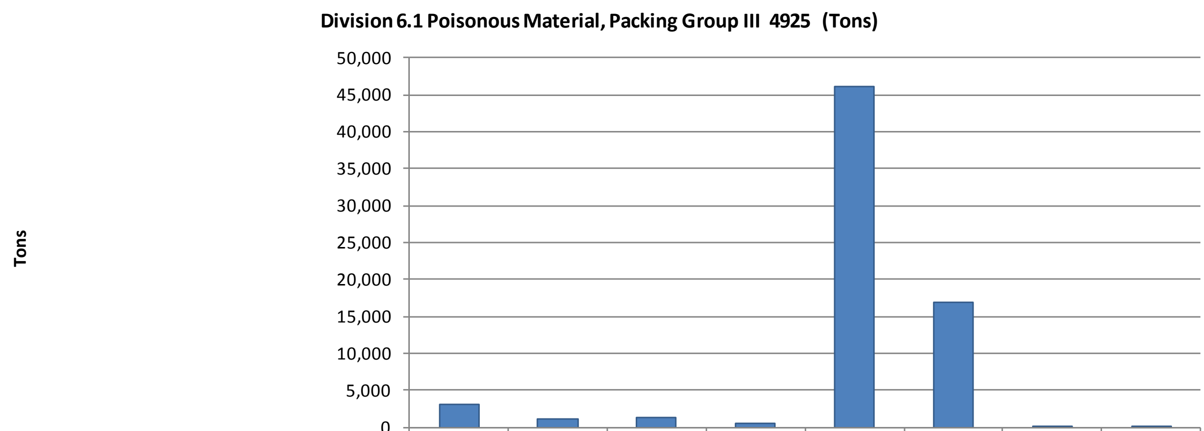


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 6.1 Poisonous Material, Other Commodities 4923 (Tons)	584	39	700	17	6,062	523	5	0

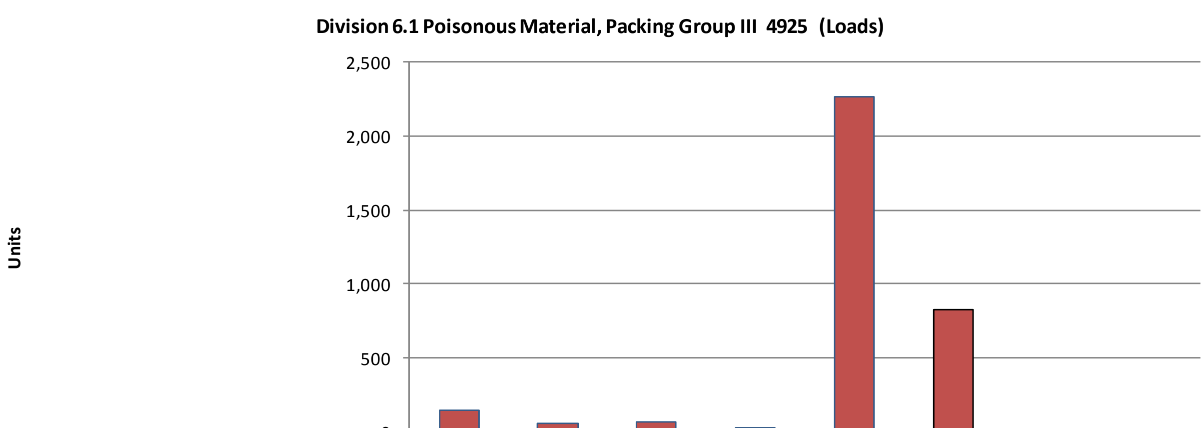
Division 6.1 Poisonous Material, Other Commodities 4923 (Loads)



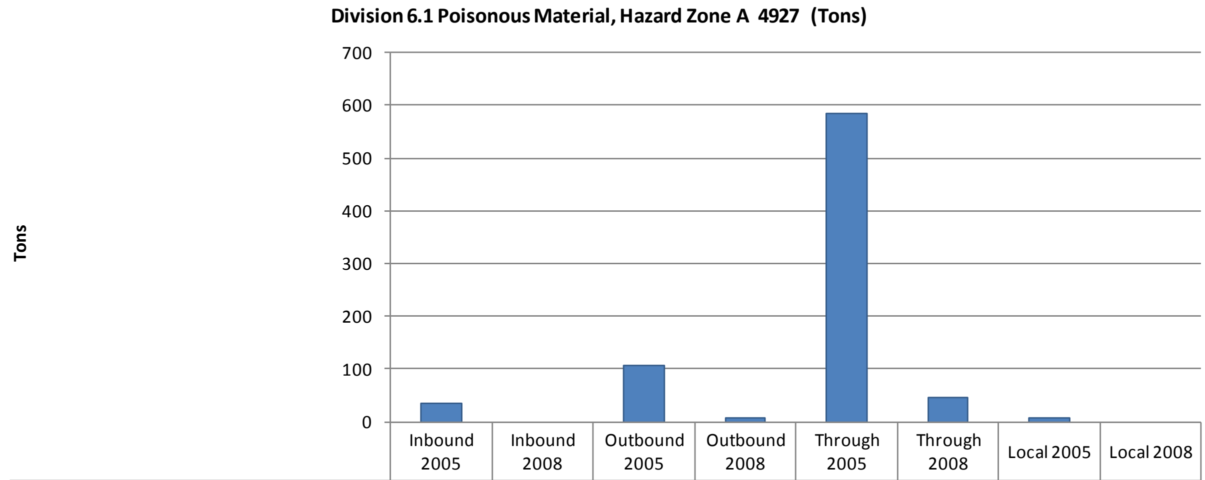
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 6.1 Poisonous Material, Other Commodities 4923 (Loads)	27	2	34	1	291	25	0	0



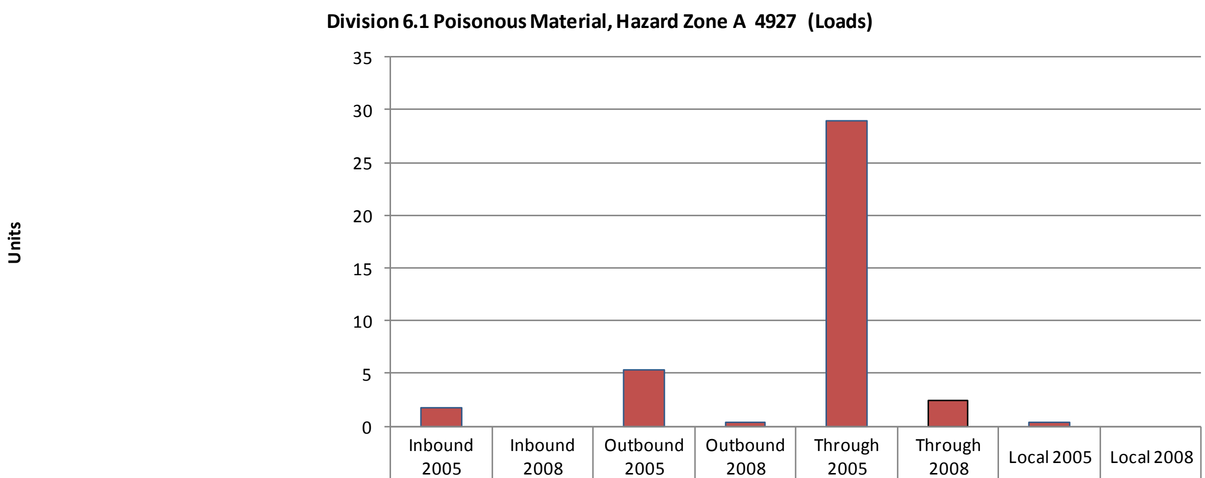
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 6.1 Poisonous Material, Packing Group III 4925 (Tons)	2,983	1,074	1,330	507	46,087	16,835	44	7



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 6.1 Poisonous Material, Packing Group III 4925 (Loads)	144	54	65	25	2,268	829	2	0

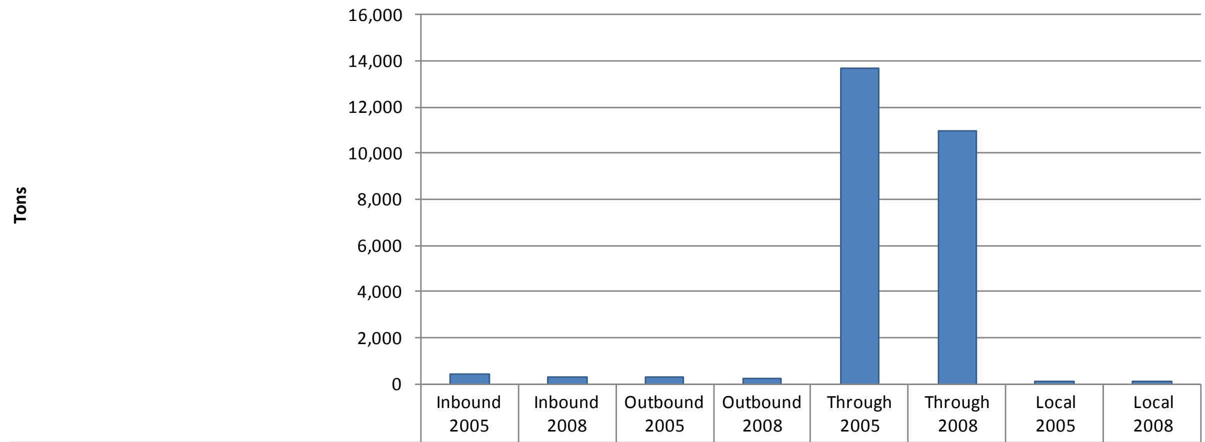


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 6.1 Poisonous Material, Hazard Zone A 4927 (Tons)	36	0	107	6	586	47	6	0



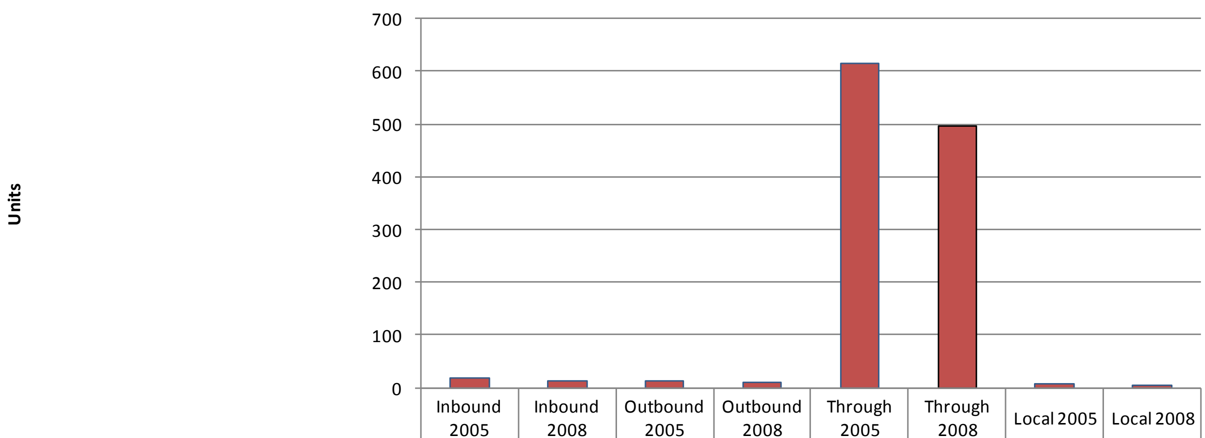
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 6.1 Poisonous Material, Hazard Zone A 4927 (Loads)	2	0	5	0	29	2	0	0

Division 6.2 Etiologic Agents, Infectious Substances 4928 (Tons)

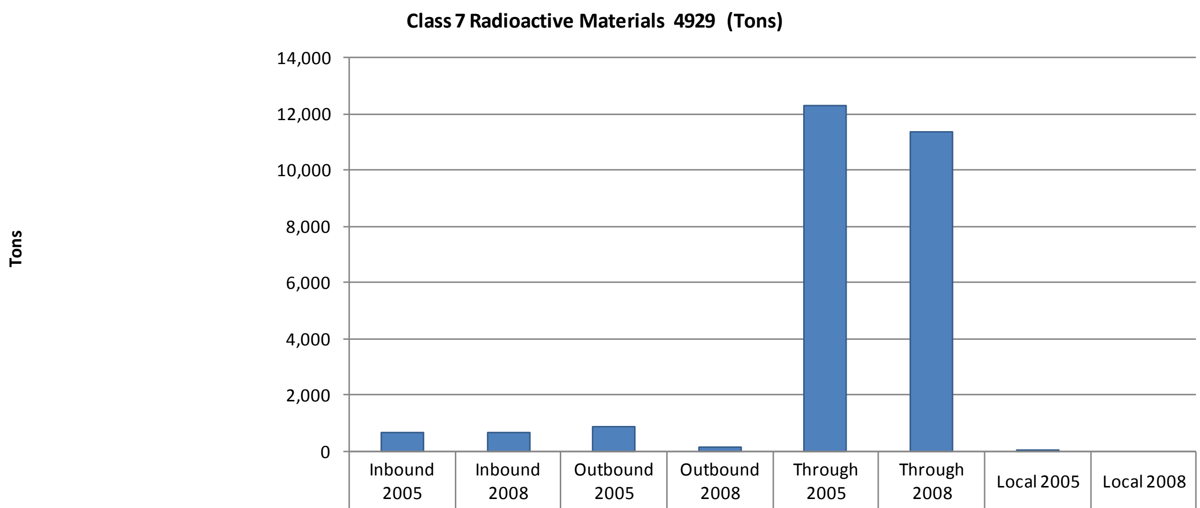


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 6.2 Etiologic Agents, Infectious Substances 4928 (Tons)	387	278	261	204	13,671	10,950	131	112

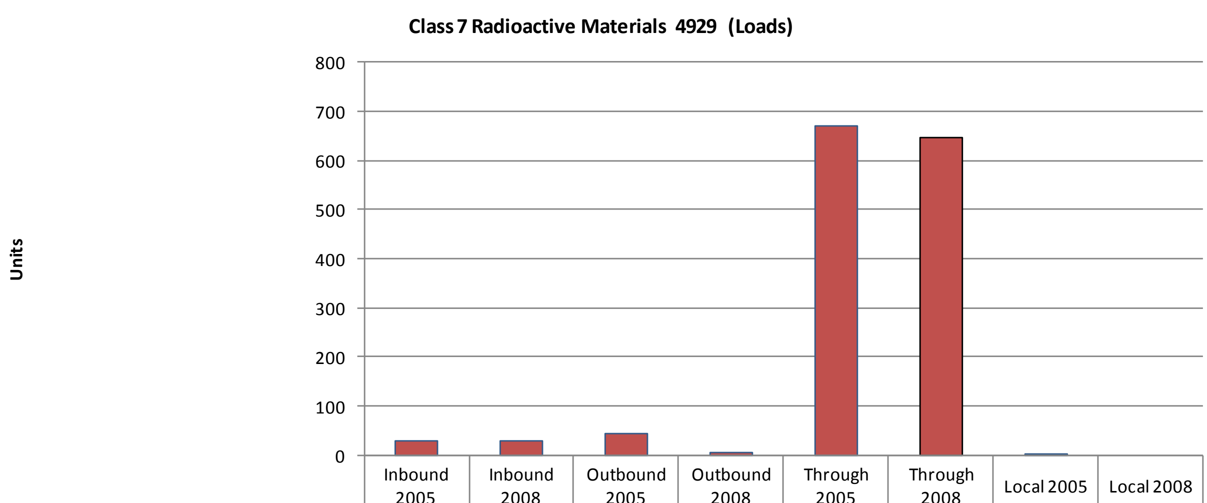
Division 6.2 Etiologic Agents, Infectious Substances 4928 (Loads)



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 6.2 Etiologic Agents, Infectious Substances 4928 (Loads)	17	13	12	9	616	497	6	5

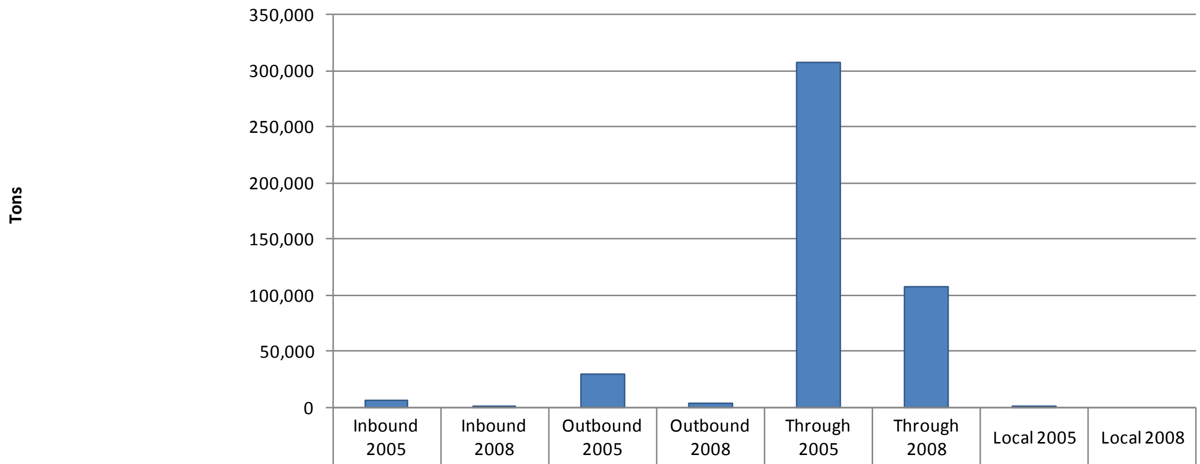


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 7 Radioactive Materials 4929 (Tons)	650	654	878	124	12,290	11,367	13	0



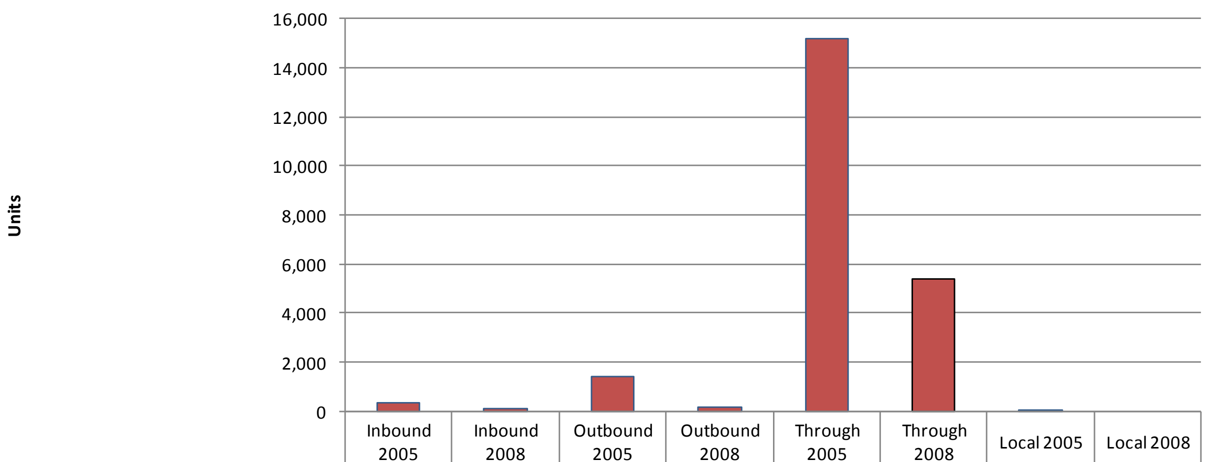
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 7 Radioactive Materials 4929 (Loads)	30	28	44	7	670	647	1	0

Class 8 Corrosive Materials 4930 (Tons)

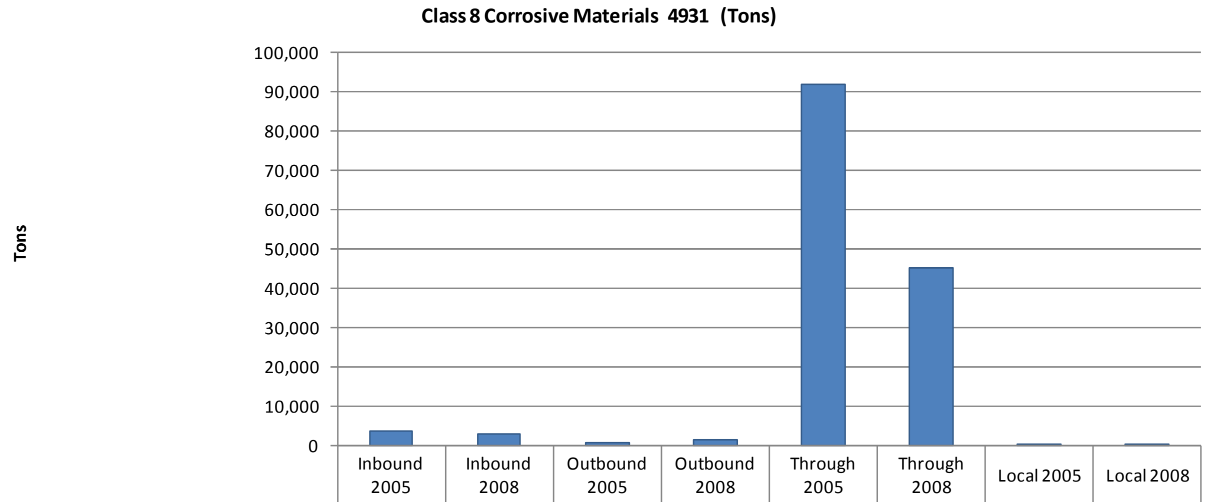


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4930 (Tons)	6,719	1,744	29,069	3,121	306,821	108,108	446	0

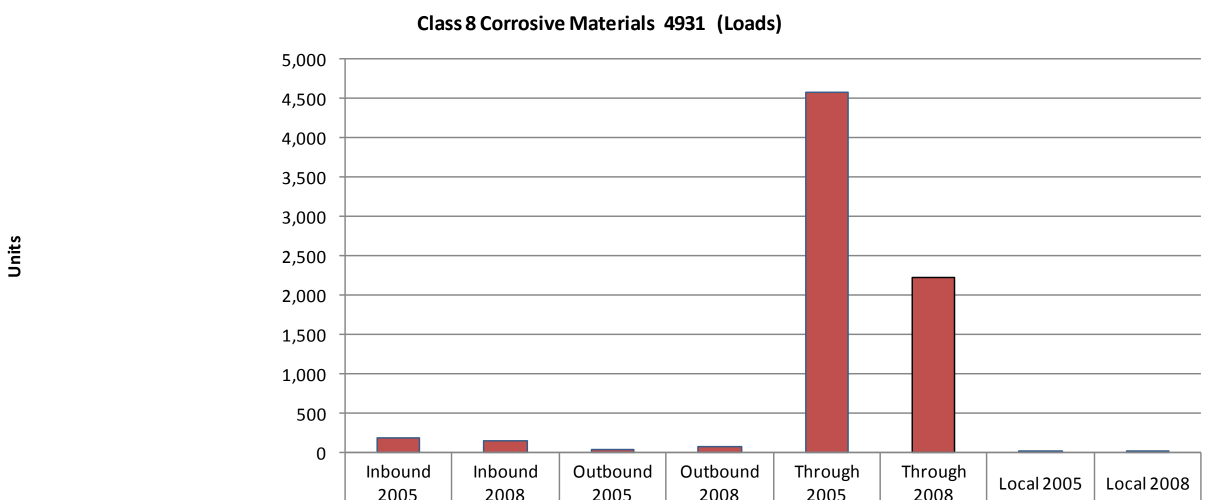
Class 8 Corrosive Materials 4930 (Loads)



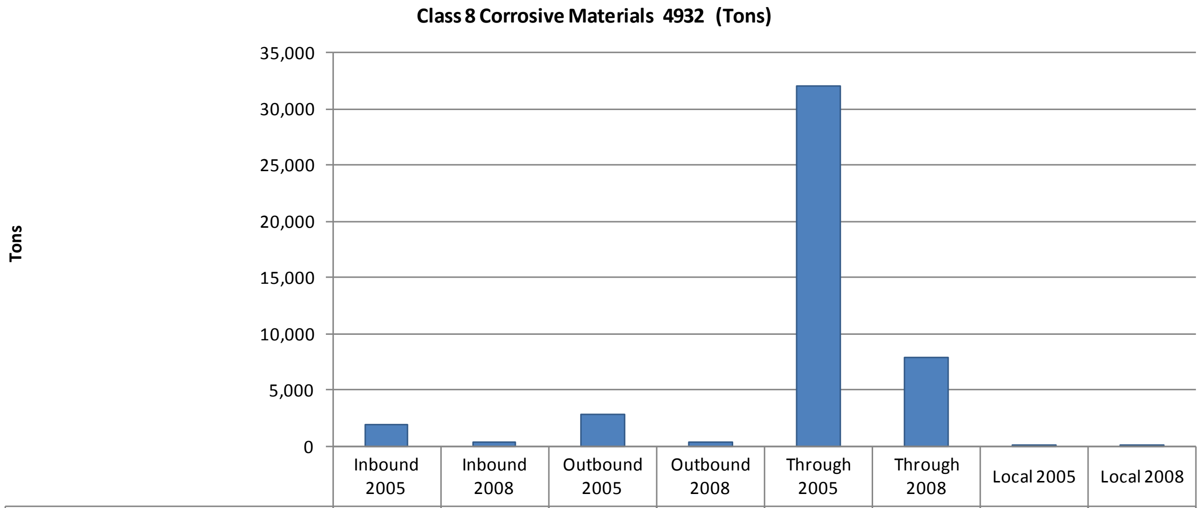
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4930 (Loads)	334	87	1,437	154	15,203	5,392	22	0



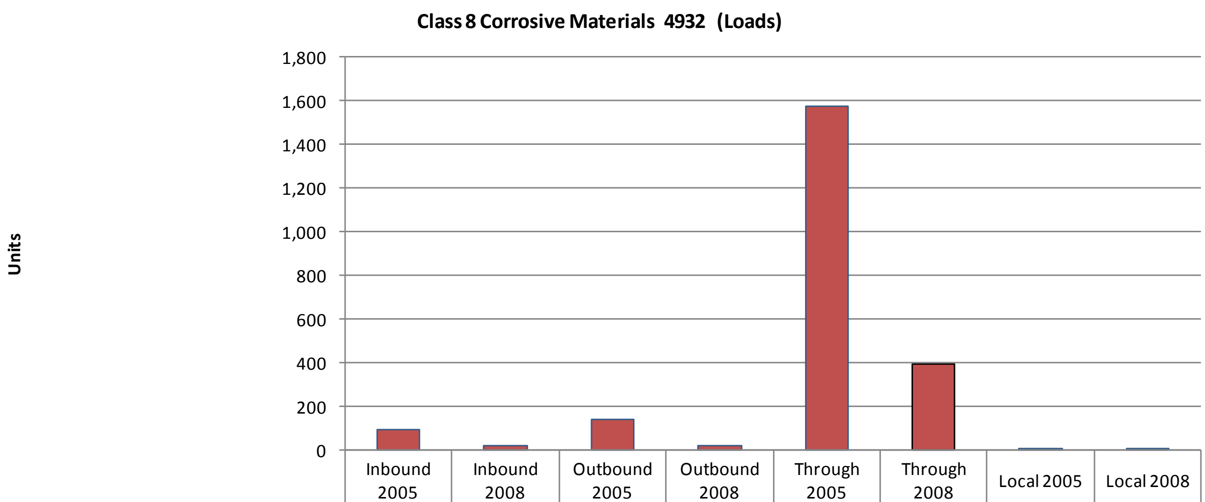
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4931 (Tons)	3,746	2,822	780	1,328	91,932	45,040	68	17



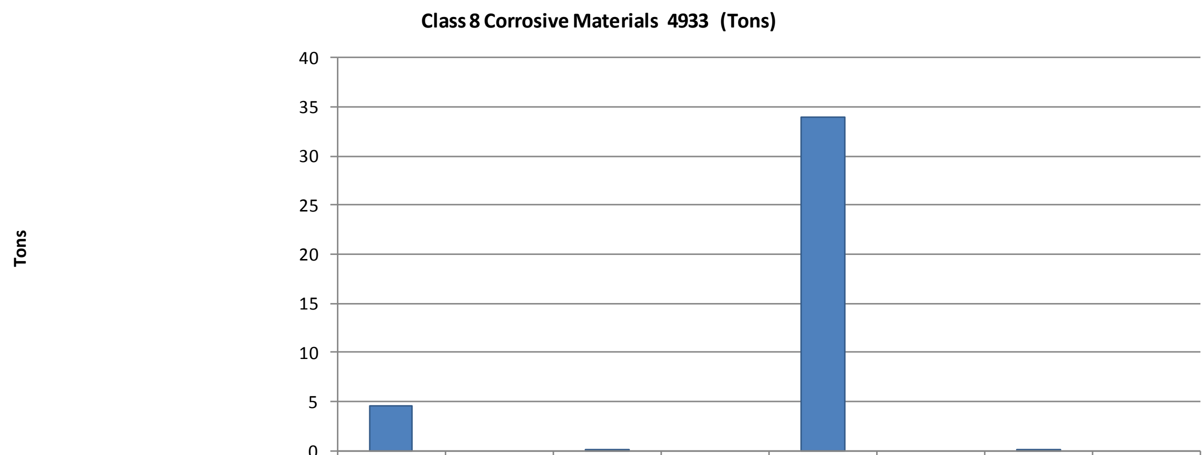
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4931 (Loads)	184	141	39	66	4,574	2,217	3	1



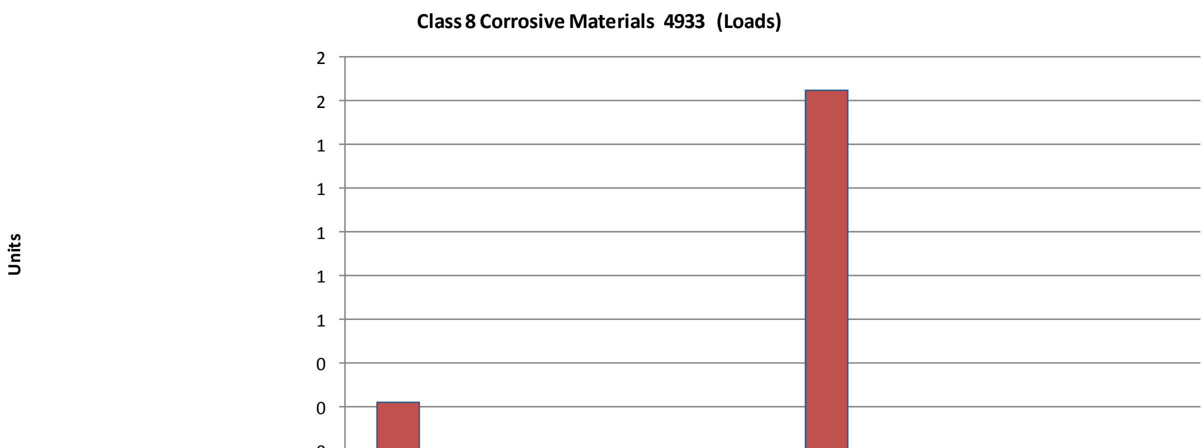
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4932 (Tons)	1,895	432	2,790	356	32,081	7,950	35	2



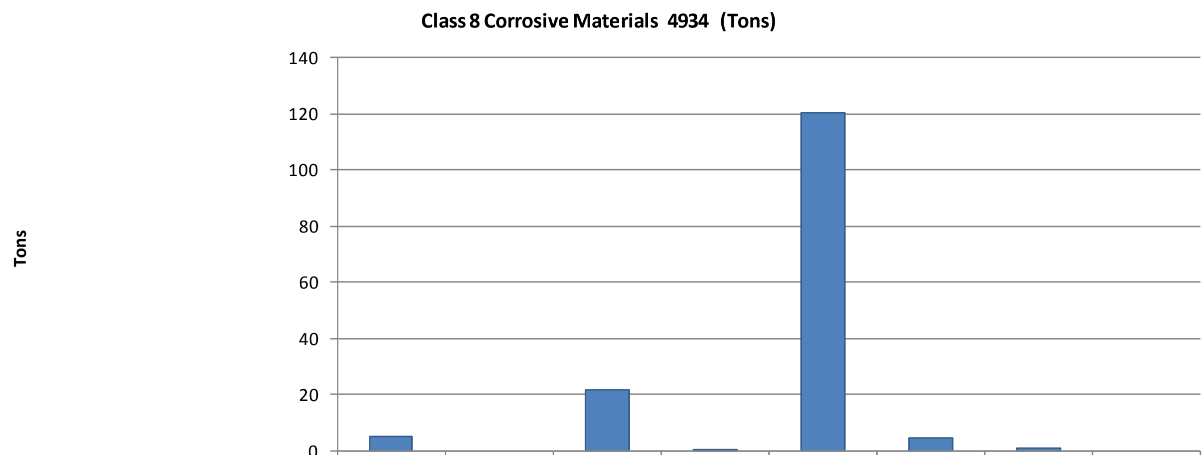
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4932 (Loads)	90	22	137	18	1,572	392	2	0



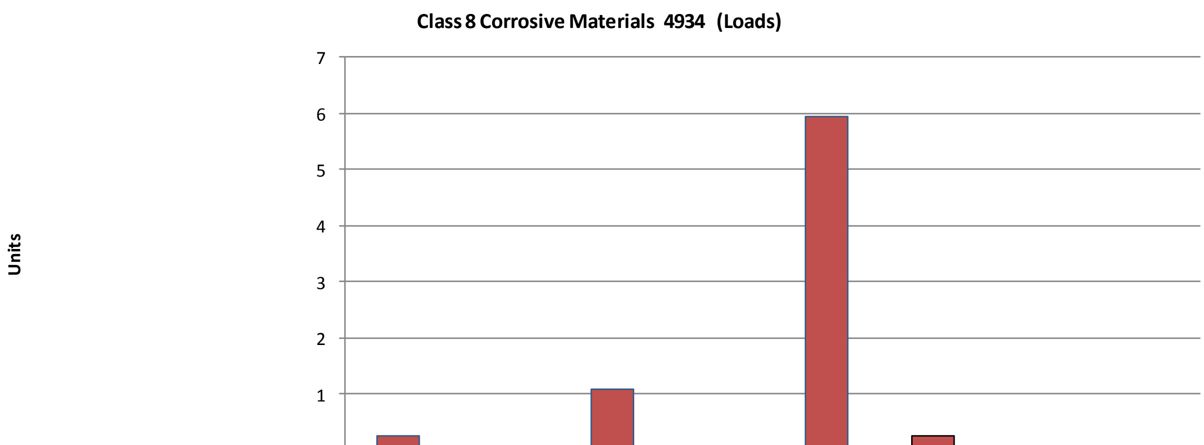
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4933 (Tons)	5	0	0	0	34	0	0	0



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4933 (Loads)	0	0	0	0	2	0	0	0

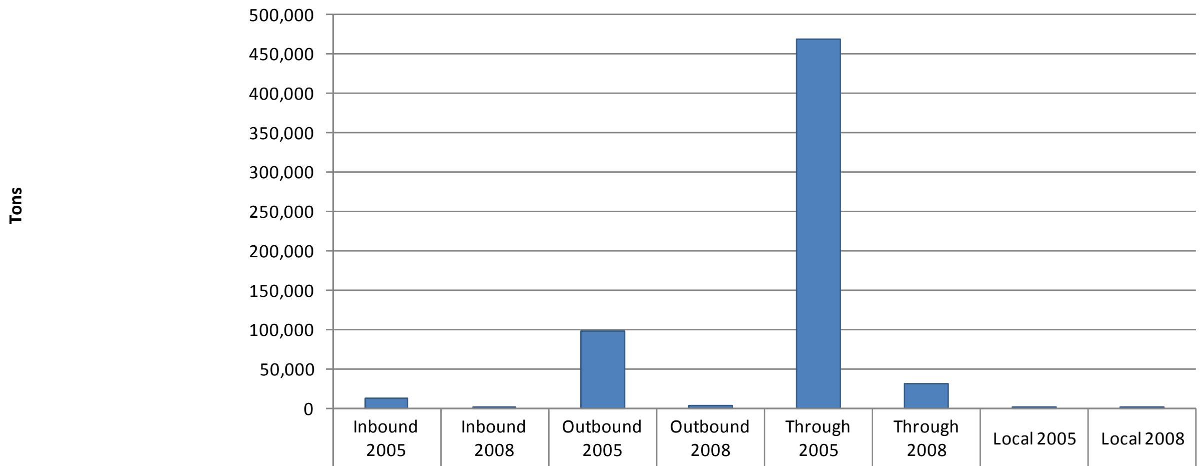


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4934 (Tons)	5	0	22	1	120	5	1	0



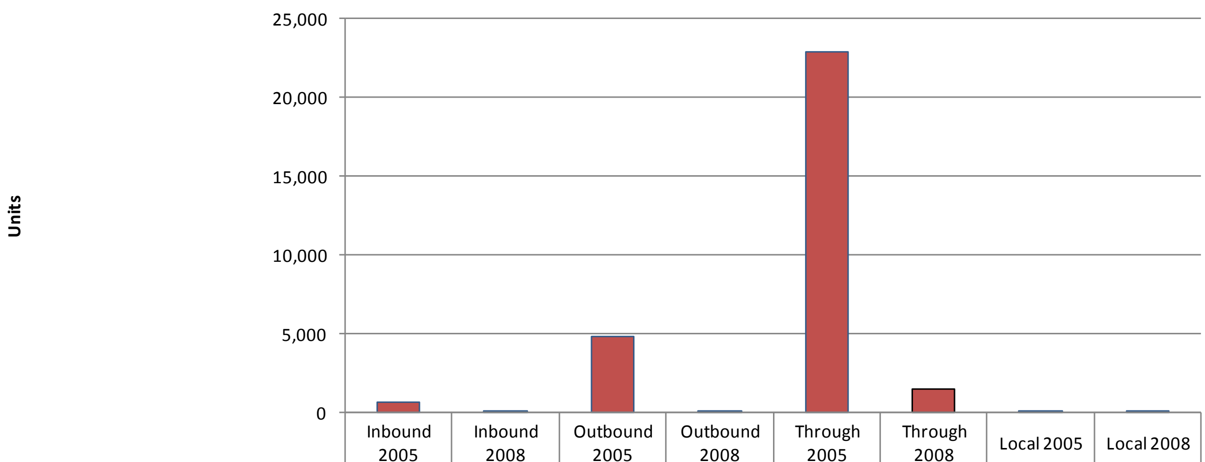
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4934 (Loads)	0	0	1	0	6	0	0	0

Class 8 Corrosive Materials 4935 (Tons)



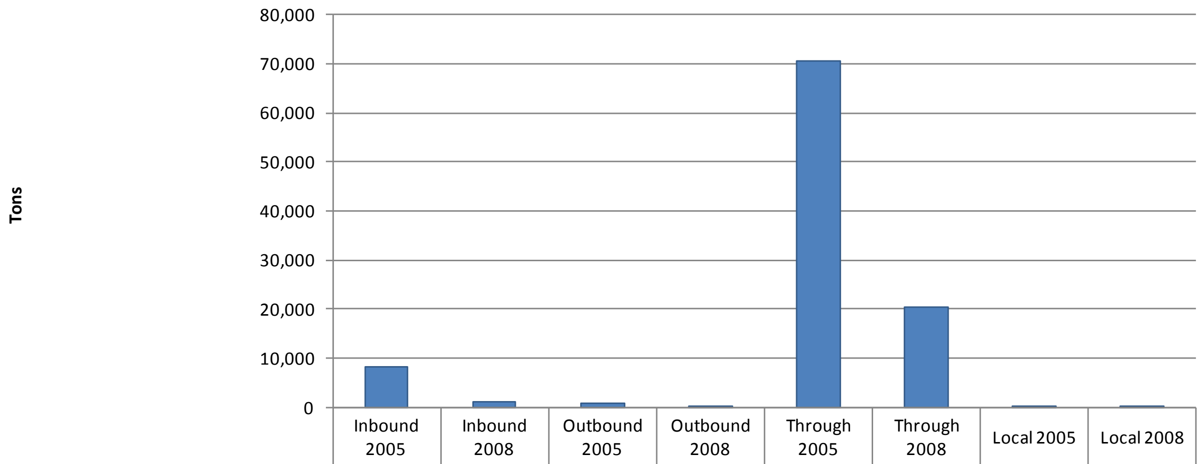
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4935 (Tons)	13,205	1,682	98,737	2,608	468,213	30,707	407	46

Class 8 Corrosive Materials 4935 (Loads)



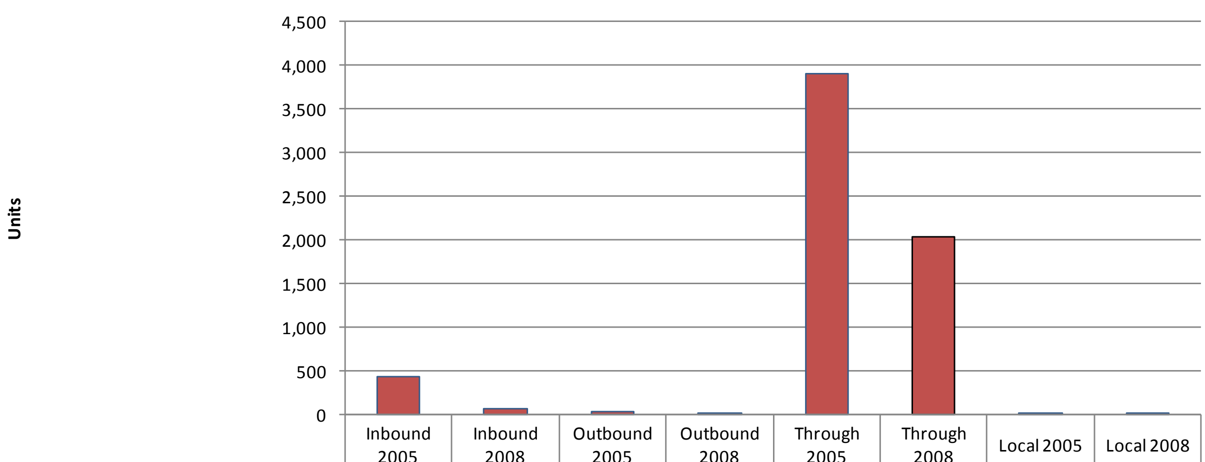
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4935 (Loads)	640	83	4,826	120	22,888	1,504	20	2

Class 8 Corrosive Materials 4936 (Tons)



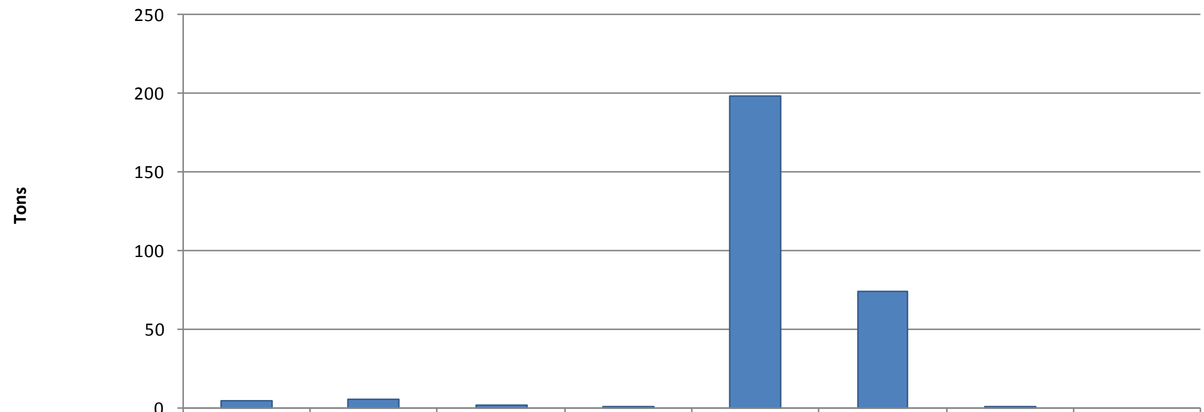
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4936 (Tons)	8,213	1,015	734	98	70,453	20,290	75	6

Class 8 Corrosive Materials 4936 (Loads)



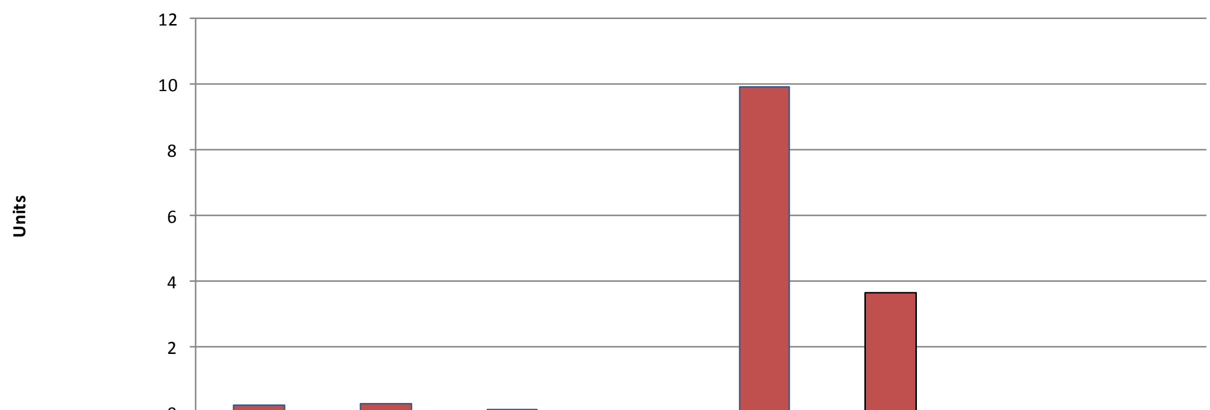
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 8 Corrosive Materials 4936 (Loads)	440	59	36	5	3,901	2,031	4	0

ORM-D 4940 (Tons)

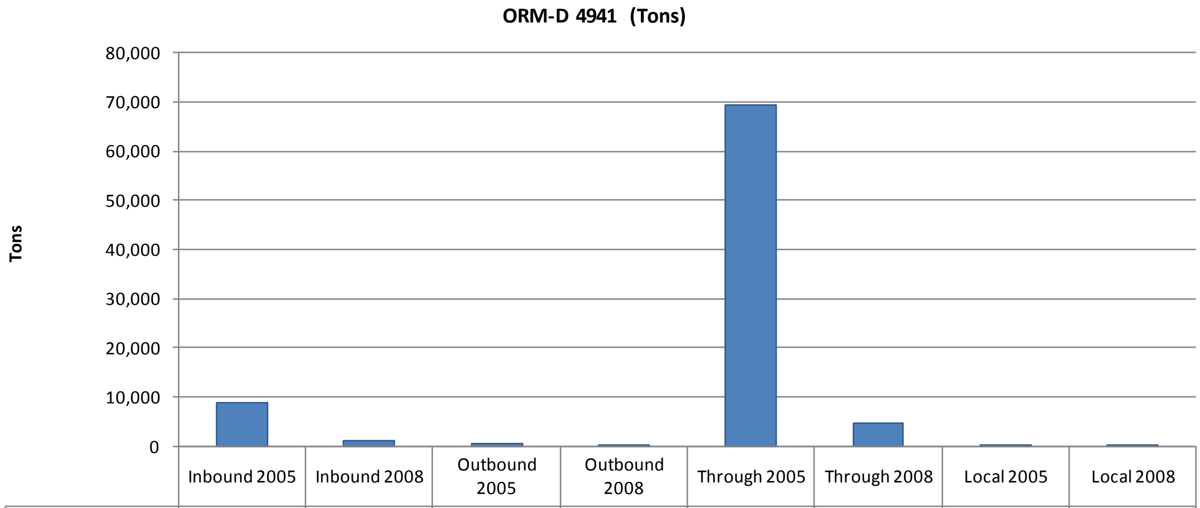


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
ORM-D 4940 (Tons)	5	5	1	1	199	74	0	0

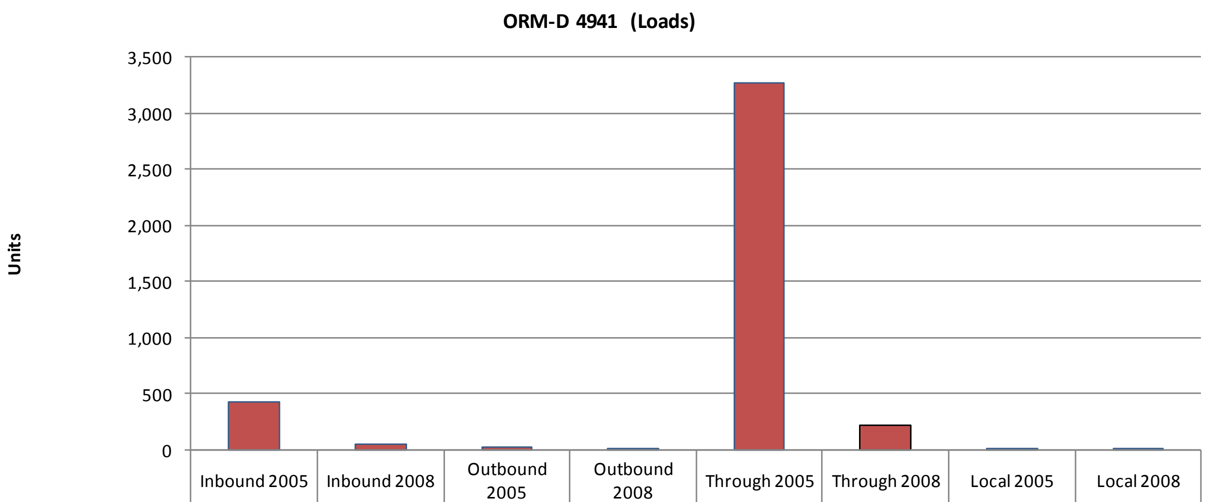
ORM-D 4940 (Loads)



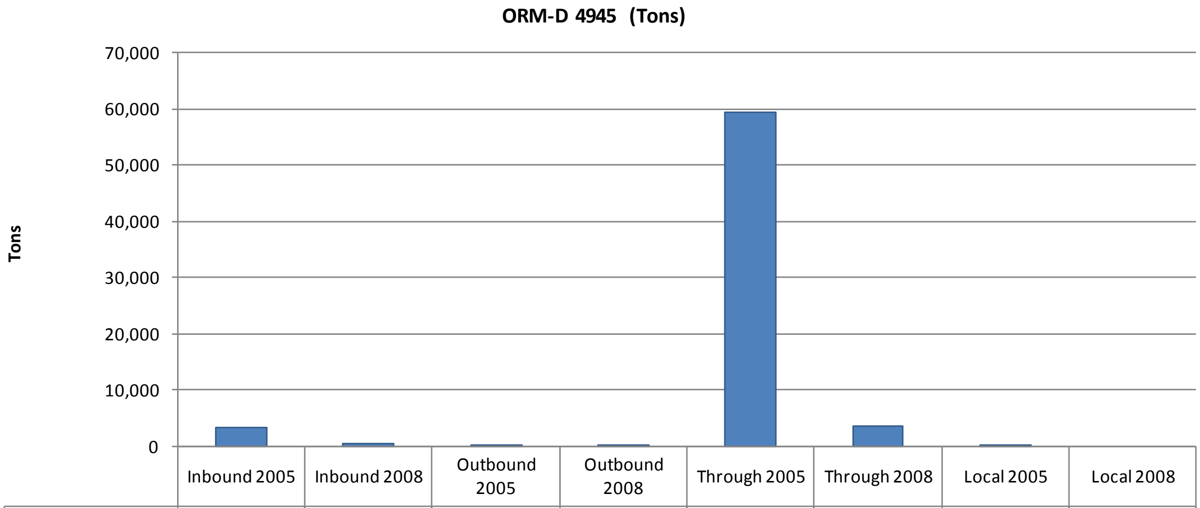
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
ORM-D 4940 (Loads)	0	0	0	0	10	4	0	0



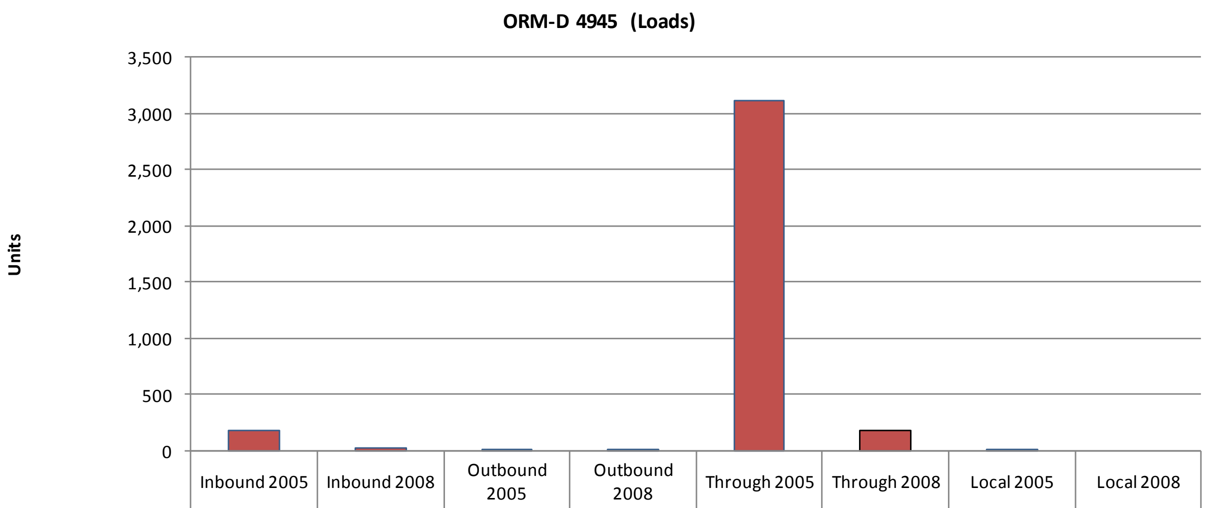
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
ORM-D 4941 (Tons)	9,006	1,260	479	82	69,448	4,646	104	1



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
ORM-D 4941 (Loads)	427	53	23	4	3,274	224	5	0

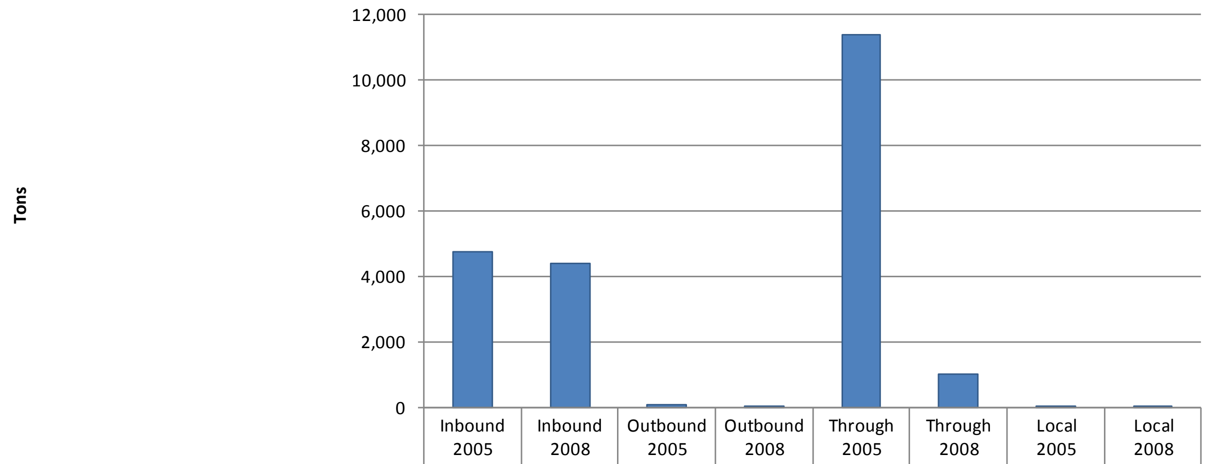


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
ORM-D 4945 (Tons)	3,450	494	3	258	59,290	3,598	1	0



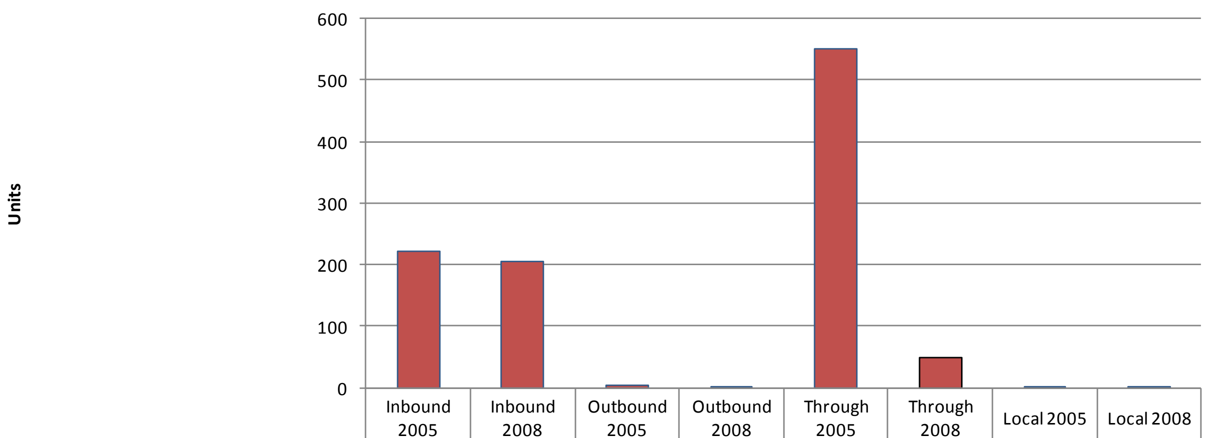
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
ORM-D 4945 (Loads)	181	25	0	12	3,109	184	0	0

Freight All Kinds, Hazardous Materials 4950 (Tons)



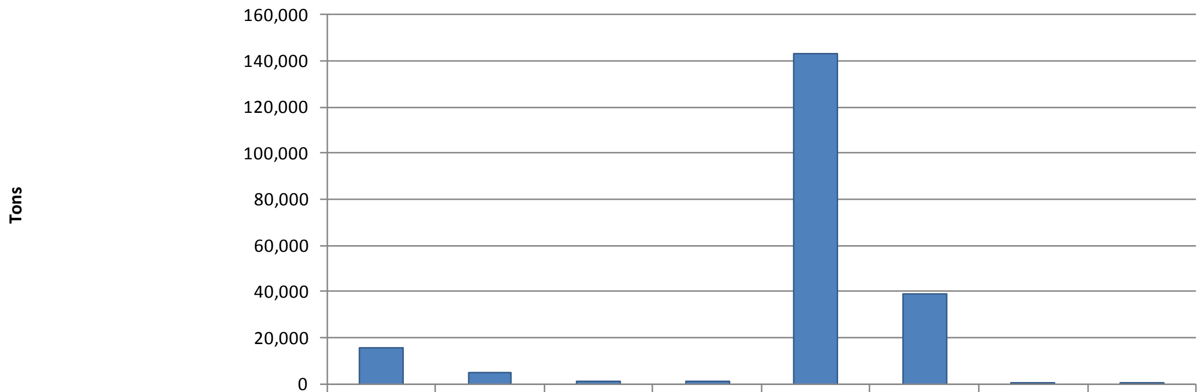
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Freight All Kinds, Hazardous Materials 4950 (Tons)	4,745	4,419	67	18	11,386	1,031	38	15

Freight All Kinds, Hazardous Materials 4950 (Loads)



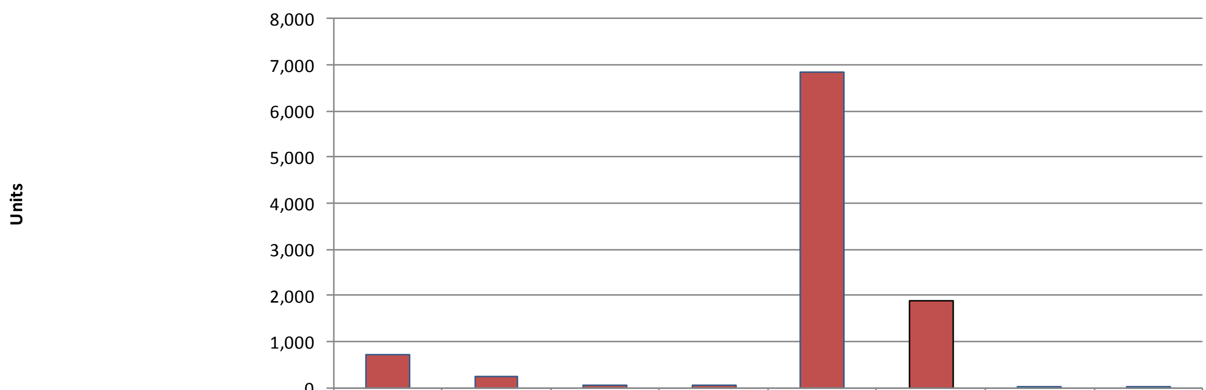
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Freight All Kinds, Hazardous Materials 4950 (Loads)	223	206	3	1	552	50	2	1

Division 9.1 Environmentally Hazardous Commodities 4960 (Tons)

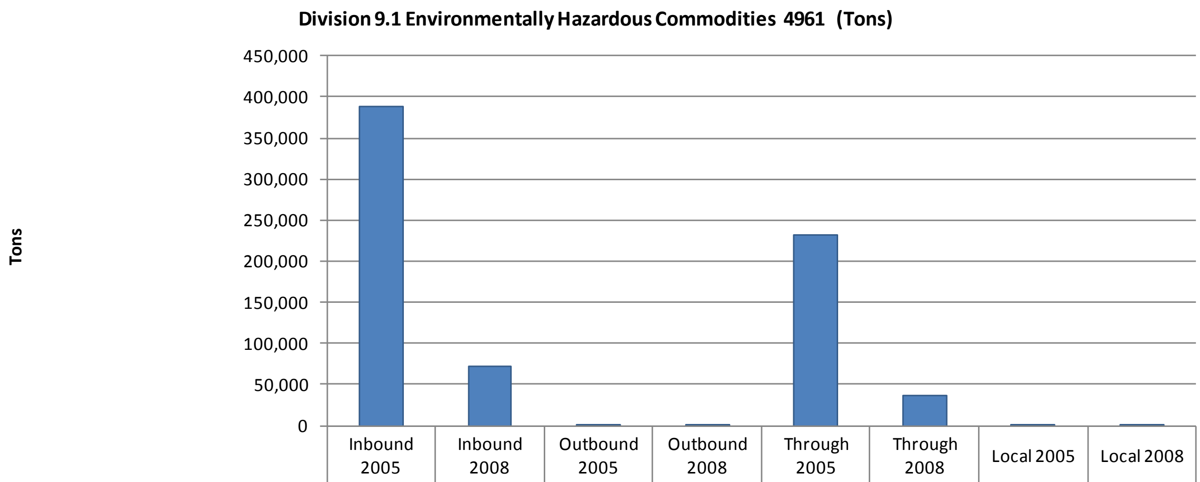


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 9.1 Environmentally Hazardous Commodities 4960 (Tons)	15,592	5,068	1,020	1,039	143,106	38,737	178	15

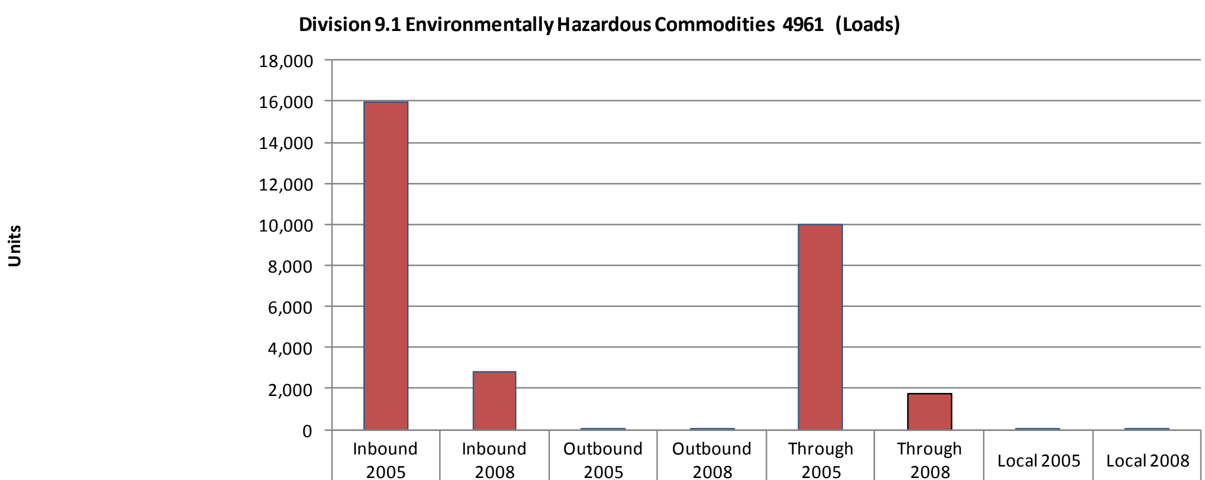
Division 9.1 Environmentally Hazardous Commodities 4960 (Loads)



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 9.1 Environmentally Hazardous Commodities 4960 (Loads)	712	225	50	52	6,830	1,895	9	1

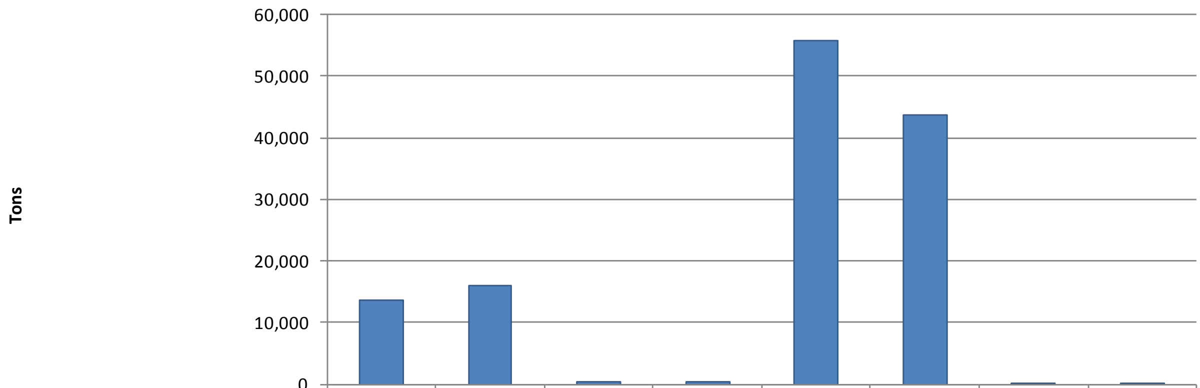


	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 9.1 Environmentally Hazardous Commodities 4961 (Tons)	388,087	72,125	317	274	231,401	36,493	67	3



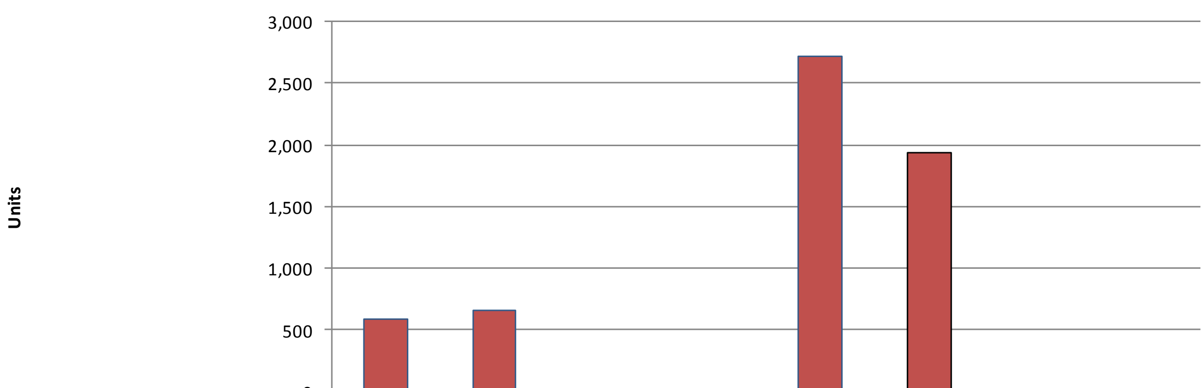
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 9.1 Environmentally Hazardous Commodities 4961 (Loads)	15,942	2,794	15	14	10,019	1,713	3	0

Division 9.2 Environmentally Hazardous Commodities 4962 (Tons)



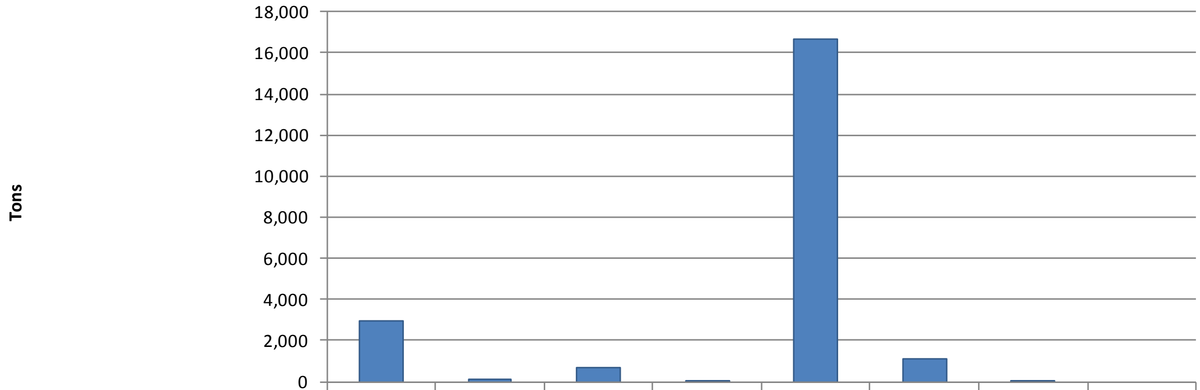
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 9.2 Environmentally Hazardous Commodities 4962 (Tons)	13,610	16,103	315	497	55,820	43,643	33	5

Division 9.2 Environmentally Hazardous Commodities 4962 (Loads)



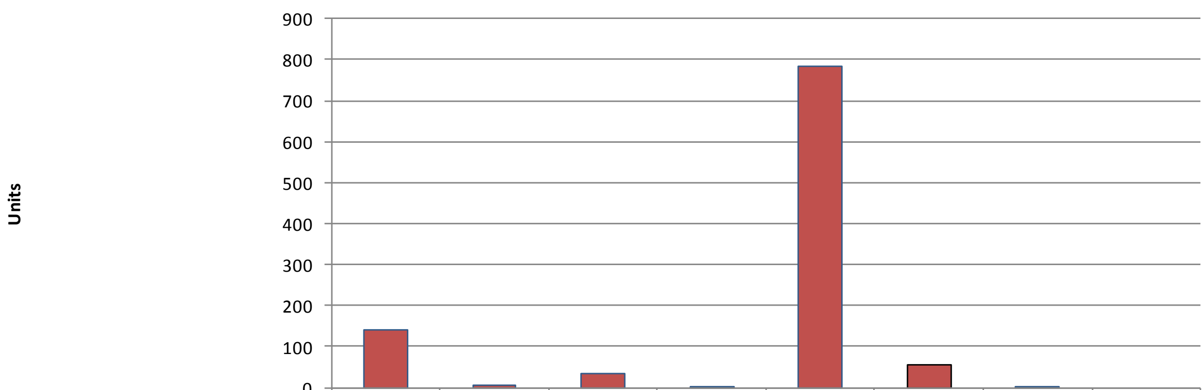
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 9.2 Environmentally Hazardous Commodities 4962 (Loads)	583	656	15	25	2,719	1,941	2	0

Division 9.2 Environmentally Hazardous Commodities 4963 (Tons)



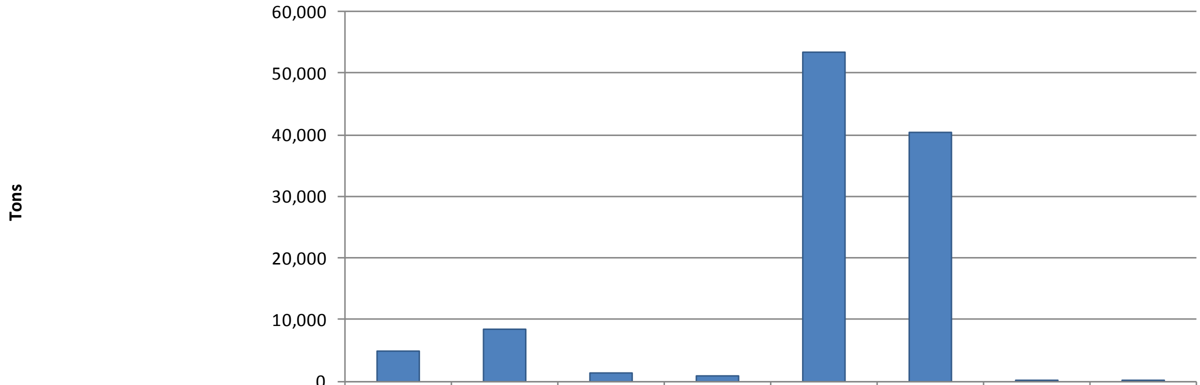
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 9.2 Environmentally Hazardous Commodities 4963 (Tons)	2,971	145	686	31	16,645	1,125	37	0

Division 9.2 Environmentally Hazardous Commodities 4963 (Loads)



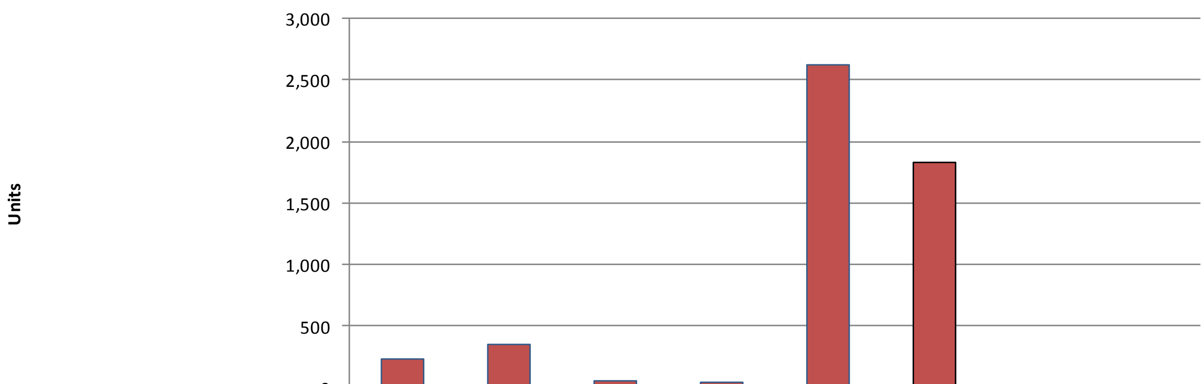
	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Division 9.2 Environmentally Hazardous Commodities 4963 (Loads)	140	7	33	1	785	54	2	0

Class 9 Environmentally Hazardous, Other Commodities 4966 (Tons)



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 9 Environmentally Hazardous, Other Commodities 4966 (Tons)	4,863	8,400	1,218	836	53,392	40,465	211	29

Class 9 Environmentally Hazardous, Other Commodities 4966 (Loads)



	Inbound 2005	Inbound 2008	Outbound 2005	Outbound 2008	Through 2005	Through 2008	Local 2005	Local 2008
Class 9 Environmentally Hazardous, Other Commodities 4966 (Loads)	235	356	60	41	2,630	1,835	11	1

APPENDIX D: STATUTORY DEFINITIONS AND DESCRIPTIONS FOR CLASSES AND DIVISIONS OF HAZARDOUS MATERIALS

§ 173.50 Class 1—Definitions.

(a) *Explosive.* For the purposes of this subchapter, an *explosive* means any substance or article, including a device, which is designed to function by explosion (*i.e.,* an extremely rapid release of gas and heat) or which, by chemical reaction within itself, is able to function in a similar manner even if not designed to function by explosion, unless the substance or article is otherwise classed under the provisions of this subchapter. The term includes a pyrotechnic substance or article, unless the substance or article is otherwise classed under the provisions of this subchapter.

(b) Explosives in Class 1 are divided into six divisions as follows:

(1) *Division 1.1* consists of explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.

(2) *Division 1.2* consists of explosives that have a projection hazard but not a mass explosion hazard.

(3) *Division 1.3* consists of explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

(4) *Division 1.4* consists of explosives that present a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.

(5) *Division 1.5* [1] consists of very insensitive explosives. This division is comprised of substances which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.

[1] The probability of transition from burning to detonation is greater when large quantities are transported in a vessel.

(6) *Division 1.6* [2] consists of extremely insensitive articles which do not have a mass explosive hazard. This division is comprised of articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

[2] The risk from articles of Division 1.6 is limited to the explosion of a single article.

§ 173.115 Class 2, Divisions 2.1, 2.2, and 2.3—Definitions.

(a) *Division 2.1 (Flammable gas).* For the purpose of this subchapter, a *flammable gas* (Division 2.1) means any material which is a gas at 20 °C (68 °F) or less and 101.3 kPa (14.7 psia) of pressure (a material which has a boiling point of 20 °C (68 °F) or less at 101.3 kPa (14.7 psia)) which—

(1) Is ignitable at 101.3 kPa (14.7 psia) when in a mixture of 13 percent or less by volume with air; or

(2) Has a flammable range at 101.3 kPa (14.7 psia) with air of at least 12 percent regardless of the lower limit. Except for aerosols, the limits specified in paragraphs (a)(1) and (a)(2) of this section shall be determined at 101.3 kPa (14.7 psia) of pressure and a temperature of 20 °C (68 °F) in accordance with the ASTM E681–85, Standard Test Method for Concentration Limits of Flammability of Chemicals or other equivalent method approved by the Associate Administrator. The flammability of aerosols is determined by the tests specified in §173.115 (k) of this section.

(b) *Division 2.2 (non-flammable, nonpoisonous compressed gas—including compressed gas, liquefied gas, pressurized cryogenic gas, compressed gas in solution, asphyxiant gas and oxidizing gas).* For the purpose of this subchapter, a non-flammable, nonpoisonous compressed gas (Division 2.2) means any material (or mixture) which—

(1) Exerts in the packaging an absolute pressure of 280 kPa (40.6 psia) or greater at 20 °C (68 °F), or is a cryogenic liquid, and

(2) Does not meet the definition of Division 2.1 or 2.3.

(c) *Division 2.3 (Gas poisonous by inhalation).* For the purpose of this subchapter, a *gas poisonous by inhalation* (Division 2.3) means a material which is a gas at 20 °C (68 °F) or less and a pressure of 101.3 kPa (14.7 psia) (a material which has a boiling point of 20 °C (68 °F) or less at 101.3 kPa (14.7 psia)) and which—

(1) Is known to be so toxic to humans as to pose a hazard to health during transportation, or

(2) In the absence of adequate data on human toxicity, is presumed to be toxic to humans because when tested on laboratory animals it has an LC_{50} value of not more than 5000 mL/m ^{3} (see §173.116(a) of this subpart for assignment of Hazard Zones A, B, C or D). LC50 values for mixtures may be determined using the formula in §173.133(b)(1)(i) or CGA Pamphlet P–20 (IBR, see §171.7 of this subchapter).

(d) *Non-liquefied compressed gas.* A gas, which when packaged under pressure for transportation is entirely gaseous at −50 °C (−58 °F) with a critical temperature less than or equal to −50 °C (−58 °F), is considered to be a non-liquefied compressed gas.

(e) *Liquefied compressed gas.* A gas, which when packaged under pressure for transportation is partially liquid at temperatures above −50 °C (−58 °F), is considered to be a liquefied compressed gas. A liquefied compressed gas is further categorized as follows:

(1) *High pressure liquefied gas* which is a gas with a critical temperature between −50 °C (−58 °F) and + 65 °C (149 °F), and

(2) *Low pressure liquefied gas* which is a gas with a critical temperature above + 65 °C (149 °F).

(f) *Compressed gas in solution.* A *compressed gas in solution* is a non-liquefied compressed gas which is dissolved in a solvent.

(g) *Cryogenic liquid.* A *cryogenic liquid* means a refrigerated liquefied gas having a boiling point colder than −90 °C (−130 °F) at 101.3 kPa (14.7 psia) absolute. A material meeting this definition is subject to requirements of this subchapter without regard to whether it meets the definition of a non-flammable, non-poisonous compressed gas in paragraph (b) of this section.

(h) *Flammable range.* The term *flammable range* means the difference between the minimum and maximum volume percentages of the material in air that forms a flammable mixture.

(i) *Service pressure.* The term *service pressure* means the authorized pressure marking on the packaging. For example, for a cylinder marked “DOT 3A1800”, the service pressure is 12410 kPa (1800 psig).

(j) *Refrigerant gas or Dispersant gas.* The terms *Refrigerant gas* and *Dispersant gas* apply to all nonpoisonous refrigerant gases; dispersant gases (fluorocarbons) listed in §172.101 of this subchapter and §§173.304, 173.314(c), 173.315(a), and 173.315(h) and mixtures thereof; and any other compressed gas having a vapor pressure not exceeding 260 psia at 54 °C(130 °F), used only as a refrigerant, dispersant, or blowing agent.

(k) The following applies to aerosols (see §171.8 of this subchapter):

(1) An aerosol must be assigned to Division 2.1 if the contents include 85% by mass or more flammable components and the chemical heat of combustion is 30 kJ/g or more;

(2) An aerosol must be assigned to Division 2.2 if the contents contain 1% by mass or less flammable components and the heat of combustion is less than 20 kJ/g.

(3) Aerosols not meeting the provisions of paragraphs (a) or (b) of this section must be classed in accordance with the appropriate tests of the UN Manual of Tests and Criteria (IBR, see §171.7 of this subchapter). An aerosol which was tested in accordance with the requirements of this subchapter in effect on December 31, 2005 is not required to be retested.

(4) Division 2.3 gases may not be transported in an aerosol container.

(5) When the contents are classified as Division 6.1, PG III or Class 8, PG II or III, the aerosol must be assigned a subsidiary hazard of Division 6.1 or Class 8, as appropriate.

(6) Substances of Division 6.1, PG I or II, and substances of Class 8, PG I are forbidden from transportation in an aerosol container.

(7) Flammable components are Class 3 flammable liquids, Class 4.1 flammable solids, or Division 2.1 flammable gases. The chemical heat of combustion must be determined in accordance with the UN Manual of Tests and Criteria (IBR, see §171.7 of this subchapter).

§ 173.120 Class 3—Definitions.

(a) *Flammable liquid.* For the purpose of this subchapter, a *flammable liquid* (Class 3) means a liquid having a flash point of not more than 60 °C (140 °F), or any material in a liquid phase with a flash point at or above 37.8 °C (100 °F) that is intentionally heated and offered for transportation or transported at or above its flash point in a bulk packaging, with the following exceptions:

(1) Any liquid meeting one of the definitions specified in §173.115.

(2) Any mixture having one or more components with a flash point of 60 °C (140 °F) or higher, that make up at least 99 percent of the total volume of the mixture, if the mixture is not offered for transportation or transported at or above its flash point.

(3) Any liquid with a flash point greater than 35 °C (95 °F) that does not sustain combustion according to ASTM D 4206 (IBR, see §171.7 of this subchapter) or the procedure in appendix H to Part 173.

(4) Any liquid with a flash point greater than 35 °C (95 °F) and with a fire point greater than 100 °C (212 °F) according to ISO 2592 (IBR, see §171.7 of this subchapter).

(5) Any liquid with a flash point greater than 35 °C (95 °F) which is in a water-miscible solution with a water content of more than 90 percent by mass.

(b) Combustible liquid. (1) For the purpose of this subchapter, a *combustible liquid* means any liquid that does not meet the definition of any other hazard class specified in this subchapter and has a flash point above 60 °C (140 °F) and below 93 °C (200 °F).

(2) A flammable liquid with a flash point at or above 38 °C (100 °F) that does not meet the definition of any other hazard class may be reclassed as a combustible liquid. This provision does not apply to transportation by vessel or aircraft, except where other means of transportation is impracticable. An elevated temperature material that meets the definition of a Class 3 material because it is intentionally heated and offered for transportation or transported at or above its flash point may not be reclassed as a combustible liquid.

(3) A combustible liquid that does not sustain combustion is not subject to the requirements of this subchapter as a combustible liquid. Either the test method specified in ASTM D 4206 or the procedure in appendix H to Part 173 may be used to determine if a material sustains combustion when heated under test conditions and exposed to an external source of flame.

(c) Flash point. (1) *Flash point* means the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. It shall be determined as follows:

(i) For a homogeneous, single-phase, liquid having a viscosity less than 45 S.U.S. at 38 °C (100 °F) that does not form a surface film while under test, one of the following test procedures shall be used:

(A) Standard Method of Test for Flash Point by Tag Closed Tester, (ASTM D 56);

(B) Standard Methods of Test for Flash Point of Liquids by Setaflash Closed Tester, (ASTM D 3278); or

(C) Standard Test Methods for Flash Point by Small Scale Closed Tester, (ASTM D 3828).

(ii) For a liquid other than one meeting all of the criteria of paragraph (c)(1)(i) of this section, one of the following test procedures shall be used:

(A) Standard Method of Test for Flash Point by Pensky—Martens Closed Tester, (ASTM D 93). For cutback asphalt, use Method B of ASTM D 93 or alternate tests authorized in this standard; or

(B) Standard Methods of Test for Flash Point of Liquids by Setaflash Closed Tester (ASTM D 3278).

(2) For a liquid that is a mixture of compounds that have different volatility and flash points, its flash point shall be determined as specified in paragraph (c)(1) of this section, on the material in the form in which it is to be shipped. If it is determined by this test that the flash point is higher than −7 °C (20 °F) a second test shall be made as follows: a portion of the mixture shall be placed in an open beaker (or similar container) of such dimensions that the height of the liquid can be adjusted so that the ratio of the volume of the liquid to the exposed surface area is 6 to one. The liquid shall be allowed to evaporate under ambient pressure and temperature (20 to 25 °C (68 to 77 °F)) for a period of 4 hours or until 10 percent by volume has evaporated, whichever comes first. A flash point is then run on a portion of the liquid remaining in the evaporation container and the lower of the two flash points shall be the flash point of the material.

(3) For flash point determinations by Setaflash closed tester, the glass syringe specified need not be used as the method of measurement of the test sample if a minimum quantity of 2 mL (0.1 ounce) is assured in the test cup.

(d) If experience or other data indicate that the hazard of a material is greater or less than indicated by the criteria specified in paragraphs (a) and (b) of this section, the Associate Administrator may revise the classification or make the material subject or not subject to the requirements of parts 170–189 of this subchapter.

§ 173.124 Class 4, Divisions 4.1, 4.2 and 4.3—Definitions.

(a) *Division 4.1 (Flammable Solid).* For the purposes of this subchapter, *flammable solid* (Division 4.1) means any of the following three types of materials:

(1) Desensitized explosives that—

(i) When dry are Explosives of Class 1 other than those of compatibility group A, which are wetted with sufficient water, alcohol, or plasticizer to suppress explosive properties; and

(ii) Are specifically authorized by name either in the §172.101Table or have been assigned a shipping name and hazard class by the Associate Administrator under the provisions of—

(A) A special permit issued under subchapter A of this chapter; or

(B) An approval issued under §173.56(i) of this part.

(2)(i) Self-reactive materials are materials that are thermally unstable and that can undergo a strongly exothermic decomposition even without participation of oxygen (air). A material is excluded from this definition if any of the following applies:

(A) The material meets the definition of an explosive as prescribed in subpart C of this part, in which case it must be classed as an explosive;

(B) The material is forbidden from being offered for transportation according to §172.101 of this subchapter or §173.21;

(C) The material meets the definition of an oxidizer or organic peroxide as prescribed in subpart D of this part, in which case it must be so classed;

(D) The material meets one of the following conditions:

(*1*) Its heat of decomposition is less than 300 J/g; or

(*2*) Its self-accelerating decomposition temperature (SADT) is greater than 75 °C (167 °F) for a 50 kg package; or

(*3*) It is an oxidizing substance in Division 5.1 containing less than 5.0% combustible organic substances; or

(E) The Associate Administrator has determined that the material does not present a hazard which is associated with a Division 4.1 material.

(ii) *Generic types.* Division 4.1 self-reactive materials are assigned to a generic system consisting of seven types. A self-reactive substance identified by technical name in the Self-Reactive Materials Table in §173.224 is assigned to a generic type in accordance with that table. Self-reactive materials not identified in the Self-Reactive Materials Table in §173.224 are assigned to generic types under the procedures of paragraph (a)(2)(iii) of this section.

(A) *Type A.* Self-reactive material type A is a self-reactive material which, as packaged for transportation, can detonate or deflagrate rapidly. Transportation of type A self-reactive material is forbidden.

(B) *Type B.* Self-reactive material type B is a self-reactive material which, as packaged for transportation, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in a package.

(C) Performance of the self-reactive material under the test procedures specified in the UN Manual of Tests and Criteria (IBR, see §171.7 of this subchapter) and the provisions of paragraph (a)(2)(iii) of this section; and

(D) *Type D.* Self-reactive material type D is a self-reactive material which—

(*1*) Detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement;

(*2*) Does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or

(*3*) Does not detonate or deflagrate at all and shows a medium effect when heated under confinement.

(E) *Type E.* Self-reactive material type E is a self-reactive material which, in laboratory testing, neither detonates nor deflagrates at all and shows only a low or no effect when heated under confinement.

(F) *Type F.* Self-reactive material type F is a self-reactive material which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power.

(G) *Type G.* Self-reactive material type G is a self-reactive material which, in laboratory testing, does not detonate in the cavitated state, will not deflagrate at all, shows no effect when heated under confinement, nor shows any explosive power. A type G self-reactive material is not subject to the requirements of this subchapter for self-reactive material of Division 4.1 provided that it is thermally stable (self-accelerating decomposition temperature is 50 °C (122 °F) or higher for a 50 kg (110 pounds) package). A self-reactive material meeting all characteristics of type G except thermal stability is classed as a type F self-reactive, temperature control material.

(iii) *Procedures for assigning a self-reactive material to a generic type.* A self-reactive material must be assigned to a generic type based on—

(A) Its physical state (i.e. liquid or solid), in accordance with the definition of liquid and solid in §171.8 of this subchapter;

(B) A determination as to its control temperature and emergency temperature, if any, under the provisions of §173.21(f);

(C) Performance of the self-reactive material under the test procedures specified in the UN Recommendations on the Transport of Dangerous Goods, Tests and Criteria (see §171.7 of this subchapter) and the provisions of paragraph (a)(2)(iii) of this section; and

(D) Except for a self-reactive material which is identified by technical name in the Self-Reactive Materials Table in §173.224(b) or a self-reactive material which may be shipped as a sample under the provisions of §173.224, the self-reactive material is approved in writing by the Associate Administrator. The person requesting approval shall submit to the Associate Administrator the tentative shipping description and generic type and—

(*1*) All relevant data concerning physical state, temperature controls, and tests results; or

(*2*) An approval issued for the self-reactive material by the competent authority of a foreign government.

(iv) *Tests.* The generic type for a self-reactive material must be determined using the testing protocol from Figure 14.2 (Flow Chart for Assigning Self-Reactive Substances to Division 4.1) from the UN Manual of Tests and Criteria.

(3) Readily combustible solids are materials that—

(i) Are solids which may cause a fire through friction, such as matches;

(ii) Show a burning rate faster than 2.2 mm (0.087 inches) per second when tested in accordance with the UN Manual of Tests and Criteria (IBR, see §171.7 of this subchapter); or

(iii) Any metal powders that can be ignited and react over the whole length of a sample in 10 minutes or less, when tested in accordance with the UN Manual of Tests and Criteria.

(b) *Division 4.2 (Spontaneously Combustible Material).* For the purposes of this subchapter, *spontaneously combustible material* (Division 4.2) means—

(1) A pyrophoric material. A pyrophoric material is a liquid or solid that, even in small quantities and without an external ignition source, can ignite within five (5) minutes after coming in contact with air when tested according to UN Manual of Tests and Criteria.

(2) A self-heating material. A self-heating material is a material that, when in contact with air and without an energy supply, is liable to self-heat. A material of this type which exhibits spontaneous ignition or if the temperature of the sample exceeds 200 °C (392 °F) during the 24-hour test period when tested in accordance with UN Manual of Tests and Criteria, is classed as a Division 4.2 material.

(c) *Division 4.3 (Dangerous when wet material).* For the purposes of this chapter, *dangerous when wet material* (Division 4.3) means a material that, by contact with water, is liable to become spontaneously flammable or to give off flammable or toxic gas at a rate greater than 1 L per kilogram of the material, per hour, when tested in accordance with UN Manual of Tests and Criteria.

§ 173.127 Class 5, Division 5.1—Definition and assignment of packing groups.

(a) *Definition.* For the purpose of this subchapter, *oxidizer* (Division 5.1) means a material that may, generally by yielding oxygen, cause or enhance the combustion of other materials.

(1) A solid material is classed as a Division 5.1 material if, when tested in accordance with the UN Manual of Tests and Criteria (IBR, see §171.7 of this subchapter), its mean burning time is less than or equal to the burning time of a 3:7 potassium bromate/cellulose mixture.

(2) A liquid material is classed as a Division 5.1 material if, when tested in accordance with the UN Manual of Tests and Criteria, it spontaneously ignites or its mean time for a pressure rise from 690 kPa to 2070 kPa gauge is less then the time of a 1:1 nitric acid (65 percent)/cellulose mixture.

(b) *Assignment of packing groups.* (1) The packing group of a Division 5.1 material which is a solid shall be assigned using the following criteria:

(i) Packing Group I, for any material which, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3:2 potassium bromate/cellulose mixture.

(ii) Packing Group II, for any material which, in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met.

(iii) Packing Group III for any material which, in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met.

(2) The packing group of a Division 5.1 material which is a liquid shall be assigned using the following criteria:

(i) Packing Group I for:

(A) Any material which spontaneously ignites when mixed with cellulose in a 1:1 ratio; or

(B) Any material which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50 percent)/cellulose mixture.

(ii) Packing Group II, any material which exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 aqueous sodium chlorate solution (40 percent)/cellulose mixture and the criteria for Packing Group I are not met.

(iii) Packing Group III, any material which exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65 percent)/cellulose mixture and the criteria for Packing Group I and II are not met.

§ 173.128 Class 5, Division 5.2—Definitions and types.

(a) *Definitions.* For the purposes of this subchapter, *organic peroxide (Division 5.2)* means any organic compound containing oxygen (O) in the bivalent -O-O- structure and which may be considered a derivative of hydrogen peroxide, where one or more of the hydrogen atoms have been replaced by organic radicals, unless any of the following paragraphs applies:

(1) The material meets the definition of an explosive as prescribed in subpart C of this part, in which case it must be classed as an explosive;

(2) The material is forbidden from being offered for transportation according to §172.101 of this subchapter or §173.21;

(3) The Associate Administrator has determined that the material does not present a hazard which is associated with a Division 5.2 material; or

(4) The material meets one of the following conditions:

(i) For materials containing no more than 1.0 percent hydrogen peroxide, the available oxygen, as calculated using the equation in paragraph (a)(4)(ii) of this section, is not more than 1.0 percent, or

(ii) For materials containing more than 1.0 percent but not more than 7.0 percent hydrogen peroxide, the available oxygen, content (O_a) is not more than 0.5 percent, when determined using the equation:

$$O_a = 16 \times \sum_{i=1}^{k} \frac{n_i c_i}{m_i}$$

where, for a material containing k species of organic peroxides:

n_i = number of -O-O- groups per molecule of the *i* th species

c_i = concentration (mass percent) of the *i* th species

m_i = molecular mass of the *i* th species

(b) *Generic types.* Division 5.2 organic peroxides are assigned to a generic system which consists of seven types. An organic peroxide identified by technical name in the Organic Peroxides Table in §173.225 is assigned to a generic type in accordance with that table. Organic peroxides not identified in the Organic Peroxides table are assigned to generic types under the procedures of paragraph (c) of this section.

(1) *Type A.* Organic peroxide type A is an organic peroxide which can detonate or deflagrate rapidly as packaged for transport. Transportation of type A organic peroxides is forbidden.

(2) *Type B.* Organic peroxide type B is an organic peroxide which, as packaged for transport, neither detonates nor deflagrates rapidly, but can undergo a thermal explosion.

(3) *Type C.* Organic peroxide type C is an organic peroxide which, as packaged for transport, neither detonates nor deflagrates rapidly and cannot undergo a thermal explosion.

(4) *Type D.* Organic peroxide type D is an organic peroxide which—

(i) Detonates only partially, but does not deflagrate rapidly and is not affected by heat when confined;

(ii) Does not detonate, deflagrates slowly, and shows no violent effect if heated when confined; or

(iii) Does not detonate or deflagrate, and shows a medium effect when heated under confinement.

(5) *Type E.* Organic peroxide type E is an organic peroxide which neither detonates nor deflagrates and shows low, or no, effect when heated under confinement.

(6) *Type F.* Organic peroxide type F is an organic peroxide which will not detonate in a cavitated state, does not deflagrate, shows only a low, or no, effect if heated when confined, and has low, or no, explosive power.

(7) *Type G.* Organic peroxide type G is an organic peroxide which will not detonate in a cavitated state, will not deflagrate at all, shows no effect when heated under confinement, and shows no explosive power. A type G organic peroxide is not subject to the requirements of this subchapter for organic peroxides of Division 5.2 provided that it is thermally stable (self-accelerating decomposition temperature is 50 °C (122 °F) or higher for a 50 kg (110 pounds) package). An organic peroxide meeting all characteristics of type G except thermal stability and requiring temperature control is classed as a type F, temperature control organic peroxide.

(c) *Procedure for assigning an organic peroxide to a generic type.* An organic peroxide shall be assigned to a generic type based on—

(1) Its physical state (i.e., liquid or solid), in accordance with the definitions for liquid and solid in §171.8 of this subchapter;

(2) A determination as to its control temperature and emergency temperature, if any, under the provisions of §173.21(f); and

(3) Performance of the organic peroxide under the test procedures specified in the UN Manual of Tests and Criteria (IBR, see §171.7 of this subchapter), and the provisions of paragraph (d) of this section.

(d) *Approvals.* (1) An organic peroxide must be approved, in writing, by the Associate Administrator, before being offered for transportation or transported, including assignment of a generic type and shipping description, except for—

(i) An organic peroxide which is identified by technical name in the Organic Peroxides Table in §173.225(c);

(ii) A mixture of organic peroxides prepared according to §173.225(b); or

(iii) An organic peroxide which may be shipped as a sample under the provisions of §173.225(b).

(2) A person applying for an approval must submit all relevant data concerning physical state, temperature controls, and tests results or an approval issued for the organic peroxide by the competent authority of a foreign government.

(e) *Tests.* The generic type for an organic peroxide shall be determined using the testing protocol from Figure 20.1(a) (Classification and Flow Chart Scheme for Organic Peroxides) from the UN Manual of Tests and Criteria (IBR, see §171.7 of this subchapter).

§ 173.132 Class 6, Division 6.1—Definitions.

(a) For the purpose of this subchapter, *poisonous material* (Division 6.1) means a material, other than a gas, which is known to be so toxic to humans as to afford a hazard to health during transportation, or which, in the absence of adequate data on human toxicity:

(1) Is presumed to be toxic to humans because it falls within any one of the following categories when tested on laboratory animals (whenever possible, animal test data that has been reported in the chemical literature should be used):

(i) *Oral Toxicity.* A liquid with an LD_{50} for acute oral toxicity of not more than 500 mg/kg or a solid with an LD_{50} for acute oral toxicity of not more than 200 mg/kg.

(ii) *Dermal Toxicity.* A material with an LD_{50} for acute dermal toxicity of not more than 1000 mg/kg.

(iii) *Inhalation Toxicity.* (A) A dust or mist with an LC_{50} for acute toxicity on inhalation of not more than 10 mg/L; or

(B) A material with a saturated vapor concentration in air at 20°C (68°F) greater than or equal to one-fifth of the LC_{50} for acute toxicity on inhalation of vapors and with an LC_{50} for acute toxicity on inhalation of vapors of not more than 5000 mL/mm ^{3} ; or

(2) Is an irritating material, with properties similar to tear gas, which causes extreme irritation, especially in confined spaces.

(b) For the purposes of this subchapter—

(1) LD_{50} (median lethal dose) for acute oral toxicity is the statistically derived single dose of a substance that can be expected to cause death within 14 days in 50% of young adult albino rats when administered by the oral route. The LD_{50} value is expressed in terms of mass of test substance per mass of test animal (mg/kg).

(2) LD_{50} for acute dermal toxicity means that dose of the material which, administered by continuous contact for 24 hours with the shaved intact skin (avoiding abrading) of an albino rabbit, causes death within 14 days in half of the animals tested. The number of animals tested must be sufficient to give statistically valid results and be in conformity with good pharmacological practices. The result is expressed in mg/kg body mass.

(3) LC_{50} for acute toxicity on inhalation means that concentration of vapor, mist, or dust which, administered by continuous inhalation for one hour to both male and female young adult albino rats, causes death within 14 days in half of the animals tested. If the material is administered to the animals as a dust or mist, more than 90 percent of the particles available for inhalation in the test must have a diameter of 10 microns or less if it is reasonably foreseeable that such concentrations could be encountered by a human during transport. The result is expressed in mg/L of air for dusts and mists or in mL/m ^{3} of air (parts per million) for vapors. See §173.133(b) for LC_{50} determination for mixtures and for limit tests.

(i) When provisions of this subchapter require the use of the LC_{50} for acute toxicity on inhalation of dusts and mists based on a one-hour exposure and such data is not available, the LC_{50} for acute toxicity on inhalation based on a four-hour exposure may be multiplied by four and the product substituted for the one-hour LC_{50} for acute toxicity on inhalation.

(ii) When the provisions of this subchapter require the use of the LC_{50} for acute toxicity on inhalation of vapors based on a one-hour exposure and such data is not available, the LC_{50} for acute toxicity on inhalation based on a four-hour exposure may be multiplied by two and the product substituted for the one-hour LC_{50} for acute toxicity on inhalation.

(iii) A solid substance should be tested if at least 10 percent of its total mass is likely to be dust in a respirable range, e.g. the aerodynamic diameter of that particle-fraction is 10 microns or less. A liquid substance should be tested if a mist is likely to be generated in a leakage of the transport containment. In carrying out the test both for solid and liquid substances, more than 90% (by mass) of a specimen prepared for inhalation toxicity testing must be in the respirable range as defined in this paragraph (b)(3)(iii).

(c) For purposes of classifying and assigning packing groups to mixtures possessing oral or dermal toxicity hazards according to the criteria in §173.133(a)(1), it is necessary to determine the acute LD_{50} of the mixture. If a mixture contains more than one active constituent, one of the following methods may be used to determine the oral or dermal LD_{50} of the mixture:

(1) Obtain reliable acute oral and dermal toxicity data on the actual mixture to be transported;

(2) If reliable, accurate data is not available, classify the formulation according to the most hazardous constituent of the mixture as if that constituent were present in the same concentration as the total concentration of all active constituents; or

(3) If reliable, accurate data is not available, apply the formula:

$$\frac{C_A}{T_A} = \frac{C_B}{T_B} + \frac{C_Z}{T_Z} = \frac{100}{T_M}$$

where:

C = the % concentration of constituent A, B ... Z in the mixture;

T = the oral LD_{50} values of constituent A, B ... Z;

T_M = the oral LD_{50} value of the mixture.

Note to formula in paragraph (c)(3): This formula also may be used for dermal toxicities provided that this information is available on the same species for all constituents. The use of this formula does not take into account any potentiation or protective phenomena.

(d) The foregoing categories shall not apply if the Associate Administrator has determined that the physical characteristics of the material or its probable hazards to humans as shown by documented experience indicate that the material will not cause serious sickness or death.

§ 173.134 Class 6, Division 6.2—Definitions and exceptions.

(a) *Definitions and classification criteria.* For the purposes of this subchapter, the following definitions and classification criteria apply to Division 6.2 materials.

(1) *Division 6.2 (Infectious substance)* means a material known or reasonably expected to contain a pathogen. A pathogen is a microorganism (including bacteria, viruses, rickettsiae, parasites, fungi) or other agent, such as a proteinaceous infectious particle (prion), that can cause disease in humans or animals. An infectious substance must be assigned the identification number UN 2814, UN 2900, UN 3373, or UN 3291 as appropriate, and must be assigned to one of the following categories:

(i) *Category A:* An infectious substance in a form capable of causing permanent disability or life-threatening or fatal disease in otherwise healthy humans or animals when exposure to it occurs. An exposure occurs when an infectious substance is released outside of its protective packaging, resulting in physical contact with humans or animals. A Category A infectious substance must be assigned to identification number UN 2814 or UN 2900, as appropriate. Assignment to UN 2814 or UN 2900 must be based on the known medical history or symptoms of the source patient or animal, endemic local conditions, or professional judgment concerning the individual circumstances of the source human or animal.

(ii) *Category B:* An infectious substance that is not in a form generally capable of causing permanent disability or life-threatening or fatal disease in otherwise healthy humans or animals when exposure to it occurs. This includes Category B infectious substances transported for diagnostic or investigational purposes. A Category B infectious substance must be described as “Biological substance, Category B” and assigned identification number UN 3373. This does not include regulated medical waste, which must be assigned identification number UN 3291.

(2) *Biological product* means a virus, therapeutic serum, toxin, antitoxin, vaccine, blood, blood component or derivative, allergenic product, or analogous product, or arsphenamine or derivative of arsphenamine (or any other trivalent arsenic compound) applicable to the prevention, treatment, or cure of a disease or condition of human beings or animals. A *biological product* includes a material subject to regulation under 42 U.S.C. 262 or 21 U.S.C. 151–159. Unless otherwise excepted, a *biological product* known or reasonably expected to contain a pathogen that meets the definition of a Category A or B infectious substance must be assigned the identification number UN 2814, UN 2900, or UN 3373, as appropriate.

(3) *Culture* means an infectious substance containing a pathogen that is intentionally propagated. *Culture* does not include a human or animal patient specimen as defined in paragraph (a)(4) of this section.

(4) *Patient specimen* means human or animal material collected directly from humans or animals and transported for research, diagnosis, investigational activities, or disease treatment or prevention. *Patient specimen* includes excreta, secreta, blood and its components, tissue and tissue swabs, body parts, and specimens in transport media (*e.g.*, transwabs, culture media, and blood culture bottles).

(5) *Regulated medical waste or clinical waste or (bio) medical waste* means a waste or reusable material derived from the medical treatment of an animal or human, which includes diagnosis and immunization, or from biomedical research, which includes the production and testing of biological products. Regulated medical waste or clinical waste or (bio) medical waste containing a Category A infectious substance must be classed as an infectious substance, and assigned to UN2814 or UN2900, as appropriate.

(6) *Sharps* means any object contaminated with a pathogen or that may become contaminated with a pathogen through handling or during transportation and also capable of cutting or penetrating skin or a packaging material. *Sharps* includes needles, syringes, scalpels, broken glass, culture slides, culture dishes, broken capillary tubes, broken rigid plastic, and exposed ends of dental wires.

(7) *Toxin* means a Division 6.1 material from a plant, animal, or bacterial source. A *toxin* containing an infectious substance or a *toxin* contained in an infectious substance must be classed as Division 6.2, described as an infectious substance, and assigned to UN 2814 or UN 2900, as appropriate.

(8) *Used health care product* means a medical, diagnostic, or research device or piece of equipment, or a personal care product used by consumers, medical professionals, or pharmaceutical providers that does not meet the definition of a diagnostic specimen, biological product, or regulated medical waste, is contaminated with potentially infectious body fluids or materials, and is not decontaminated or disinfected to remove or mitigate the infectious hazard prior to transportation.

(b) *Exceptions.* The following are not subject to the requirements of this subchapter as Division 6.2 materials:

(1) A material that does not contain an infectious substance or that is unlikely to cause disease in humans or animals.

(2) Non-infectious biological materials from humans, animals, or plants. Examples include non-infectious cells, tissue cultures, blood or plasma from individuals not suspected of having an infectious disease, DNA, RNA or other non-infectious genetic elements.

(3) A material containing micro-organisms that are non-pathogenic to humans or animals.

(4) A material containing pathogens that have been neutralized or inactivated such that they no longer pose a health risk.

(5) A material with a low probability of containing an infectious substance, or where the concentration of the infectious substance is at a level naturally occurring in the environment so it cannot cause disease when exposure to it occurs. Examples of these materials include: Foodstuffs; environmental samples, such as water or a sample of dust or mold; and substances that have been treated so that the pathogens have been neutralized or deactivated, such as a material treated by steam sterilization, chemical disinfection, or other appropriate method, so it no longer meets the definition of an infectious substance.

(6) A biological product, including an experimental or investigational product or component of a product, subject to Federal approval, permit, review, or licensing requirements, such as those required by the Food and Drug Administration of the U.S. Department of Health and Human Services or the U.S. Department of Agriculture.

(7) Blood collected for the purpose of blood transfusion or the preparation of blood products; blood products; plasma; plasma derivatives; blood components; tissues or organs intended for use in transplant operations; and human cell, tissues, and cellular and tissue-based products regulated under authority of the Public Health Service Act (42 U.S.C. 264–272) and/or the Food, Drug, and Cosmetic Act (21 U.S.C. 332 *et seq.*).

(8) Blood, blood plasma, and blood components collected for the purpose of blood transfusion or the preparation of blood products and sent for testing as part of the collection process, except where the person collecting the blood has reason to believe it contains an infectious substance, in which case the test sample must be shipped as a Category A or Category B infectious substance in accordance with §173.196 or §173.199, as appropriate.

(9) Dried blood spots or specimens for fecal occult blood detection placed on absorbent filter paper or other material.

(10) A Division 6.2 material, other than a Category A infectious substance, contained in a patient sample being transported for research, diagnosis, investigational activities, or disease treatment or prevention, or a biological product, when such materials are transported by a private or contract carrier in a motor vehicle used exclusively to transport such materials. Medical or clinical equipment and laboratory products may be transported aboard the same vehicle provided they are properly packaged and secured against exposure or contamination. If the human or animal sample or biological product meets the definition of regulated medical waste in paragraph (a)(5) of this section, it must be offered for transportation and transported in conformance with the appropriate requirements for regulated medical waste.

(11) A human or animal sample (including, but not limited to, secreta, excreta, blood and its components, tissue and tissue fluids, and body parts) being transported for routine testing not related to the diagnosis of an infectious disease, such as for drug/alcohol testing, cholesterol testing, blood glucose level testing, prostate specific antibody testing, testing to monitor kidney or liver function, or pregnancy testing, or for tests for diagnosis of non-infectious diseases, such as cancer biopsies, and for which there is a low probability the sample is infectious.

(12) Laundry and medical equipment and used health care products, as follows:

(i) Laundry or medical equipment conforming to the regulations of the Occupational Safety and Health Administration of the Department of Labor in 29 CFR 1910.1030. This exception includes medical equipment intended for use, cleaning, or refurbishment, such as reusable surgical equipment, or equipment used for testing where the components within which the equipment is contained essentially function as packaging. This exception does not apply to medical equipment being transported for disposal.

(ii) Used health care products not conforming to the requirements in 29 CFR 1910.1030 and being returned to the manufacturer or the manufacturer's designee are excepted from the requirements of this subchapter when offered for transportation or transported in accordance with this paragraph (b)(12). For purposes of this paragraph, a health care product is used when it has been removed from its original packaging. Used health care products contaminated with or suspected of contamination with a Category A infectious substance may not be transported under the provisions of this paragraph.

(A) Each used health care product must be drained of free liquid to the extent practicable and placed in a watertight primary container designed and constructed to assure that it remains intact under conditions normally incident to transportation. For a used health care product capable of cutting or penetrating skin or packaging material, the primary container must be capable of retaining the product without puncture of the packaging under normal conditions of transport. Each primary container must be marked with a BIOHAZARD marking conforming to 29 CFR 1910.1030(g)(1)(i).

(B) Each primary container must be placed inside a watertight secondary container designed and constructed to assure that it remains intact under conditions normally incident to transportation. The secondary container must be marked with a BIOHAZARD marking conforming to 29 CFR 1910.1030(g)(1)(i).

(C) The secondary container must be placed inside an outer packaging with sufficient cushioning material to prevent movement between the secondary container and the outer packaging. An itemized list of the contents of the primary container and information concerning possible contamination with a Division 6.2 material, including its possible location on the product, must be placed between the secondary container and the outside packaging.

(D) Each person who offers or transports a used health care product under the provisions of this paragraph must know about the requirements of this paragraph.

(13) Any waste or recyclable material, other than regulated medical waste, including—

(i) Garbage and trash derived from hotels, motels, and households, including but not limited to single and multiple residences;

(ii) Sanitary waste or sewage;

(iii) Sewage sludge or compost;

(iv) Animal waste generated in animal husbandry or food production; or

(v) Medical waste generated from households and transported in accordance with applicable state, local, or tribal requirements.

(14) Corpses, remains, and anatomical parts intended for interment, cremation, or medical research at a college, hospital, or laboratory.

(15) Forensic material transported on behalf of a U.S. Government, state, local or Indian tribal government agency, except that—

(i) Forensic material known or suspected to contain a Category B infectious substance must be shipped in a packaging conforming to the provisions of §173.24.

(ii) Forensic material known or suspected to contain a Category A infectious substance or an infectious substance listed as a select agent in 42 CFR Part 73 must be transported in packaging capable of meeting the test standards in §178.609 of this subchapter. The secondary packaging must be marked with a BIOHAZARD symbol conforming to specifications in 29 CFR 1910.1030(g)(1)(i). An itemized list of contents must be enclosed between the secondary packaging and the outer packaging.

(16) Agricultural products and food as defined in the Federal Food, Drug, and Cosmetics Act (21 U.S.C. 332 *et seq.*).

(c) *Exceptions for regulated medical waste.* The following provisions apply to the transportation of regulated medical waste:

(1) A regulated medical waste transported by a private or contract carrier is excepted from—

(i) The requirement for an “INFECTIOUS SUBSTANCE” label if the outer packaging is marked with a “BIOHAZARD” marking in accordance with 29 CFR 1910.1030; and

(ii) The specific packaging requirements of §173.197, if packaged in a rigid non-bulk packaging conforming to the general packaging requirements of §§173.24 and 173.24a and packaging requirements specified in 29 CFR 1910.1030, provided the material does not include a waste concentrated stock culture of an infectious substance. Sharps containers must be securely closed to prevent leaks or punctures.

(2) A waste stock or culture of a Category B infectious substance may be offered for transportation and transported as a regulated medical waste when it is packaged in a rigid non-bulk packaging conforming to the general packaging requirements of §§173.24 and 173.24a and packaging requirements specified in 29 CFR 1910.1030 and transported by a private or contract carrier in a vehicle used exclusively to transport regulated medical waste. Medical or clinical equipment and laboratory products may be transported aboard the same vehicle provided they are properly packaged and secured against exposure or contamination. Sharps containers must be securely closed to prevent leaks or punctures.

(d) If an item listed in paragraph (b) or (c) of this section meets the definition of another hazard class or if it is a hazardous substance, hazardous waste, or marine pollutant, it must be offered for transportation and transported in accordance with applicable requirements of this subchapter.

§ 173.136 Class 8—Definitions.

(a) For the purpose of this subchapter, “corrosive material” (Class 8) means a liquid or solid that causes full thickness destruction of human skin at the site of contact within a specified period of time. A liquid, or a solid which may become liquid during transportation, that has a severe corrosion rate on steel or aluminum based on the criteria in §173.137(c)(2) is also a corrosive material..

(b) If human experience or other data indicate that the hazard of a material is greater or less than indicated by the results of the tests specified in paragraph (a) of this section, PHMSA may revise its classification or make the determination that the material is not subject to the requirements of this subchapter.

(c) Skin corrosion test data produced no later than September 30, 1995, using the procedures of part 173, appendix A, in effect on September 30, 1995 (see 49 CFR part 173, appendix A, revised as of October 1, 1994) for appropriate exposure times may be used for classification and assignment of packing group for Class 8 materials corrosive to skin.

§ 173.140 Class 9—Definitions.

For the purposes of this subchapter, *miscellaneous hazardous material* (Class 9) means a material which presents a hazard during transportation but which does not meet the definition of any other hazard class. This class includes:

(a) Any material which has an anesthetic, noxious or other similar property which could cause extreme annoyance or discomfort to a flight crew member so as to prevent the correct performance of assigned duties; or

(b) Any material that meets the definition in §171.8 of this subchapter for an elevated temperature material, a hazardous substance, a hazardous waste, or a marine pollutant.

APPENDIX E: NOTICE OF PROPOSED RULEMAKING LIST- HAZARDOUS MATERIALS RISK-BASED ADJUSTMENT OF TRANSPORTATION SECURITY PLAN REQUIREMENTS; FINAL RULE (PHMSA, 2010).

NPRM LIST

Class	Current threshold	Proposed threshold	Change
1.1	Any quantity	Any quantity	None.
1.2	Any quantity	Any quantity	None.
1.3	Any quantity	Any quantity	None.
1.4	A quantity requiring placarding	Any quantity of UN 0104, 0237, 0255, 0267, 0289, 0361, 0365, 0366, 0440, 0441, 0455, 0456, 0500.	Security plan required only for detonators and shaped charges.
1.5	A quantity requiring placarding	Any quantity	Security plan required for all shipments.
1.6	A quantity requiring placarding	Not subject	Security plan not required for any Division 1.6 shipments.
2.1	A quantity requiring placarding	>3,000 L in a single packaging	Security plan not required for 3,000 L (793 gallons) or less.
2.2	A quantity requiring placarding	Not subject except for oxygen and gases with a subsidiary 5.1 hazard (<3,000 L (793 gallons) in a single packaging).	Security plan not required for most non-flammable, non-poisonous compressed gas shipments.
2.3	Any quantity	Any quantity	None.
3	A quantity requiring placarding	>3,000 L (793 gallons) in a single packaging and any quantity of Class 3 desensitized explosives.	Security plan not required for 3,000 L (793 gallons) or less except for desensitized explosives.
4.1	A quantity requiring placarding	Any quantity desensitized explosives	Security plan not required except for desensitized explosives.
4.2	A quantity requiring placarding	PG I and II only in quantities >3,000 kg in a single packaging.	Security plan not required for PG III materials.
4.3	Any quantity	Any quantity	None.
5.1	A quantity requiring placarding	PG I and II liquids, perchlorates, ammonium nitrate (including fertilizers) in quantities >3,000 L (793 gallons) in a single packaging.	Security plan not required for PG III liquids or unlisted solids.
5.2	Any quantity of Organic peroxide, Type B, liquid or solid, temperature controlled.	Any quantity of Organic peroxide, Type B, liquid or solid, temperature controlled.	None.
6.1	A quantity requiring placarding; any quantity of PIH material.	Any quantity of PG I; >3,000 L (793 gallons) for PG II and III.	Security plan not required for 3,000 L (793 gallons) or less of PG II and III.
6.2	Select agents	Select agents	None.
7	Shipments requiring Yellow III label; highway route controlled quantity.	For radionuclides covered by the IAEA Code of Conduct, Category 1 and Category 2 sources per package; for all other radionuclides, 3000 A2 per package.	Security plan only required for Class 7 materials that pose transportation security risk.
8	A quantity requiring placarding	PG I only in quantities >3,000 L (793 gallons) in a single packaging.	Security plan not required for PG II and III materials.
9	Capacity >3,500 gallons for liquid/gas; volumetric capacity >468 cubic feet for solids.	Not subject	Security plan not required for Class 9 materials.